# POST-CONSUMER SOLID WASTE REDUCTION AS A MEANS OF AMELIORATING THE URBAN SOLID WASTE PROBLEM

Larry Lee Ayres

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# ABSTRACT

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AMELIORATING THE URBAN SOLID WA

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This thesis is an attempt to show the need for and assess the viability of post-consumer solid waste reduction as a partner of resource/energy recovery in meeting the objectives of Public Law 89-272, the Federal Solid Waste Disposal Act. In an effort to identify the pros and cons of post-consumer solid waste reduction, attempts to legislate measures intended to reduce waste, programs intended to result in voluntary measures, studies conducted to estimate program benefits and evaluations of the actual impacts of programs implemented are discussed in some detail. The practical feasibility of resource/energy recovery through 1990 is proven to be insufficient to allow even the expected increases in post-consumer solid waste quantities from 1975 onward to be so processed. One section of this paper identifies the

adverse effects of a number of actions which have been suggested or, in some cases, implemented in an effort to reduce post-consumer solid waste generation. Another section addresses the benefits of such actions. Specific categories of the post-consumer solid waste stream are identified as potential targets for reduction, and the mechanisms which could be used are discussed. Among such mechanisms are taxes, deposit systems, bans, design regulations, performance standards and educational programs. Guidelines for policy selection are suggested. Finally, the interests of the federal, state and local governments in post-consumer solid waste reduction are identified and discussed, and programs are suggested for each level of government.

## DESCRIPTORS

Deposit
Design regulations
Deterrent tax
Excessive packaging
Minimum deposit legislation
Product durability
Resource/energy recovery
Reuse
Unit tax
Use tax
Waste reduction
Weight based tax

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# 1.0 INTRODUCTION

## 1.1 Federal Action on Solid Waste Disposal Problems

The Federal Solid Waste Disposal Act (Public Law 89-272) of 1965 was enacted to set into motion a national research and development effort for new and improved methods of proper and economic solid waste disposal and to provide technical and financial assistance to lower levels of government along these lines.(1)*

The specific problems which were addressed by the above legislation are as follows(2):

(A) Serious financial, management, intergovernmental, and technical problems in the disposal of solid wastes.

(B) Threats to public health, esthetics, and the general public nuisance caused by many manners of solid waste disposal.

(C) Waste and depletion of natural resources.

Passage of the above act began the Federal Government's economic and technical involvement in an area which had historically been considered a local and state concern only.

## 1.2 Resource/Energy Recovery is Born

Several extensions to the previously mentioned act, primarily intended to continue the economic aid to lower governments, followed; but the first major change occurred in the Resource Recovery Act of

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*Parenthetical references placed superior to the line of text refer to the bibliography.

1970. The emphasis was placed upon resource recovery as a method which would work toward solution of the economic, environmental and resource depletion problems. Provisions were made for continued Federal economic aid in this area and many private organizations were by this time well embarked on ventures of this nature. To date, many larger municipalities have planned or undertaken major investment programs in resource/energy recovery facilities.

The continuing energy crisis has given even stronger backing to the idea of use of the solid waste stream as a resource and put additional emphasis on the use of unsalvagable portions as fuel. Resource/energy recovery was now more than a "gleam in the eye". It had been born and had begun to mature.

The following reasons, not seen explicitly stated in any resource material, may underlie the rapid evolution and apparent acceptance on all fronts of resource/energy recovery.

(A) The average citizen sees no threat to solid waste collection services or costs as they directly impact upon him. There has been no indication, except in rare circumstances such as source separation (the act of segregating trash and garbage at the home into broad groupings for ease of reclamation), that his degree of direct involvement will increase in either the physical or economic sense. In short, service is expected to be provided as usual.

(B) Those concerned with the environmental and resource depletion aspects see resource/energy recovery as a step in the proper direction.

(C) Industry and business see either no direct impact upon them or see the opportunity for the development of new processes and systems which can be sold outright or operated at a profit. There is also the potential for lower production costs through the use of secondary or reclaimed materials which could prove cheaper than virgin materials. In addition, there is some evidence that the industrial and business sectors may well have previously felt that co-operation along these lines could act to prevent Federal "meddling" in other areas such as source reduction, perhaps, to solve the same problems.(3,4)

(D) State and local governments actively pursue the Federal grant monies available because resource/energy recovery does, in fact, offer a partial solution to some solid waste disposal problems and at the same time seems to be endorsed by most of the truely vocal groups pressing them in these areas. The economic potential of the urban solid waste stream, as indicated in Table 1, also holds the hope that this new solution could eventually be self-supporting or, at worst, not a significant increase in solid waste disposal costs.

## 1.3 Terminology

Prior to embarking upon a major discussion of this type, some terminology definitions are in order. As used herein, and unless specified otherwise, the following terminology applies:

> Waste--a material that its producer does not want. Although the product may have value to someone, either in its present or in a converted state, if its producer does not ask for reimbursement for its removal it is considered to be waste and at some stage, will enter a waste handling system, either private or public.(5)

## TABLE 1

### COMPARATIVE ECONOMICS OF SOLID WASTE DISPOSAL BY LANDFILL AND RECOVERY AS ENERGY

(1,000 ton/day, 300,000 ton/year operation, 20-year life)

| | Energy (Fuel) Recovery System | | Sanitary Landfill (Land Cost=$1,000/acre) | |
|---|---|---|---|---|
| | ($) | ($/Ton) | ($) | ($/Ton) |
| Capital Requirements | | | | |
| Amortized Investment | 1,315,000 | | 200,000 | |
| Fixed Investment | 9,300,000 | | 950,000 | |
| Recoverable Investment | | | | |
| Land | 450,000 | | 4,800,000 | |
| Working Capital | 300,000 | | 125,000 | |
| Total | 750,000 | | 4,925,000 | |
| Total Capital Requirement | 11,365,000 | | 6,075,000 | |
| Annual Costs of Operation | | | | |
| Direct Operating Costs | 1,200,000 | 4.00 | 505,000 | 1.68 |
| Fixed Costs | 180,000 | 0.60 | 40,000 | 0.13 |
| Capital Charges | | | | |
| Land at 6%/annum | 27,000 | 0.09 | 288,000 | 0.96 |
| Other Charges | 1,203,000 | 4.01 | 160,000 | 0.53 |
| Total | 1,230,000 | 4.10 | 448,000 | 1.49 |
| Total Annual Cost | 2,610,000 | 8.70 | 993,000 | 3.30 |
| Value of Recovered Resources | | | | |
| Ferrous Metal (20,000 tons at $12.00) | 240,000 | 0.80 | | |
| Energy (Fuel) (2.7 x $10^{12}$ Btu at \$0.50/$10^6$) | 1,350,000 | 4.50 | | |
| Total Resource Value | 1,590,000 | 5.30 | 0 | 0 |
| Net Operating Cost | 1,020,000 | 3.40 | 993,000 | 3.30 |

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Source: Midwest Research Institute Report, Base Line Forecasts of Resource Recovery, 1972 to 1990, March 1975.(6)

*Post-consumer municipal solid waste*--the material generated by households, commercial establishments and other general business activities of the economy. Excluded are industrial, farming, animal, mineral and mining wastes.(7)

*Source (waste) reduction*--a reduction in the consumption of materials and products which results in a reduction in the generation of solid wastes.(8) Used interchangeably with waste reduction.

*Reuse*--in the case of a container, the item is simply refilled. Reuse implies that the item is utilized again in its original configuration; reuse makes reprocessing of the waste product unnecessary.(9)

*Returnable container*--a container that is accepted for return after use. Usually a cash deposit is paid upon purchase and refunded upon container return as an incentive for return.(10)

*Redesign for waste reduction*--manufacturer changes in the configuration of an item so that it uses less material or energy or to make it more easily repairable, longer lasting, or less susceptible to superficial or style changes.(9)

*Excessive packaging*--packaging may be considered as excessive if the materials used are in short supply, if the amount of energy required is great in relation to substitute forms of packaging, if materials are difficult to dispose of and more satisfactory alternatives are available, or if the packaging impedes consumer use of a product (by being difficult or hazardous to open, for example).(11)

*Deposit*--a fee paid by the consumer upon purchase of a product which is refunded when the empty or used product is returned for reuse, refill or repair.(12)

*Penny a pound tax*--a uniform tax on all packaging assessed on a one cent per pound or twenty dollar per ton basis at the manufacturer level.(13)

*Unit tax*--a uniform tax on all packaging assessed on each unit of packaging regardless of size or configuration.(13)

## 1.4 Problem to be Addressed

In a report recently completed for the Office of Solid Waste Management Programs (OSWMP) of the U. S. Environmental Protection

Agency (EPA), Midwest Research Institute estimates that by 1990, 40 metropolitan areas in the U. S. will be operating 60 centralized resource recovery plants, processing about 49 million tons of mixed municipal solid wastes annually. This represents approximately 25 percent of the 200 million tons of mixed municipal solid wastes expected to be generated in that year.(14) Comparing this with estimates of 1971 U. S. generation of the same category of wastes, 125 million tons(15), we see a projected increase of 75 million tons from 1971 to 1990 but only a portion, something less than 49 million tons, of this increase is expected to be processed by resource/energy recovery facilities. It seems obvious that in the absolute sense, resource/energy recovery will not alone reverse the level of expenditure for solid waste disposal, not to mention collection. Neither will it reduce the absolute environmental degredation and natural resource exhaustion it was developed to alleviate.

The problem we now face is one of finding additional means of conserving natural resources, protecting our environment, reducing overall energy utilization in our society and reducing the staggering costs of urban solid waste collection and disposal.

Research of Federal Solid Waste legislation from 1965 on will show mention of reducing the waste flow at the source, source reduction, and waste reduction. Until about 1972 little was done along these lines as the "white knight" of resource recovery had materialized. Recently, increased emphasis at all levels of government is being placed upon <u>post-consumer solid waste reduction</u> as a partner of resource recovery in meeting our society's objectives in the area of solid waste

management. Some attempts, as we shall see later, have been made to legislate post-consumer solid waste reduction, to convince business and commerce that waste reduction is to their advantage and to rally public support behind the idea.

### 1.41 Problem Statement

The costs of municipal solid waste management, for a number of reasons including increasing labor costs, increasing environmental controls, increasing land costs, increasing haul distances and increasing per capita generation of solid wastes, are annually becoming a greater drain on municipal funds. Resource/energy recovery is only a partial solution. The problem, therefore, simply states is "What is the viability of post-consumer solid waste reduction as an additional step and how can it be implemented?"

## 1.5 Research Objectives

Many publications have been written dealing with resource/energy recovery and some documents dealing with waste reduction have begun to be available recently. Interest seems to be more closely focused upon waste reduction in the recent past. Therefore, the objectives to be attained in this thesis are as follows:

(A) To review the available literature on post-consumer solid waste reduction to determine the potential for success in this area.

(B) To review attempts to legislate post-consumer solid waste reduction at the federal, state, county and local level and to determine what was proposed, what was passed into law, what was not and the

reasons therefor.

(C) To point out, through specific examples, the measures taken by various groups to cause the voter to accept or reject post-consumer solid waste reduction legislation and the underlying reasons.

(D) To discuss the known results of legislation approved for post-consumer solid waste reduction from the standpoint of both costs and benefits in the direct economic, environmental impact and energy conservation senses.

(E) To provide examples of steps taken by various industries and commercial organizations to reduce post-consumer solid waste and report upon the success or failure thereof.

(F) To suggest new methods of post-consumer solid waste reduction.

(G) To suggest what the responsibilities at various levels of government might be as relates to post-consumer solid waste reduction.

(H) Through the above, to provide the local government official with an insight into the potential of post-consumer solid waste reduction and an idea of how to most successfully approach the issue in his own jurisdiction.

# 2.0 ADVERSE EFFECTS OF POST-CONSUMER SOLID WASTE REDUCTION, PREDICTED AND ACTUAL

## 2.1 Introductory Comments

Almost all actions taken to date intended to result, primarily, in post-consumer solid waste reduction of some sort have been measures by state and local governments directed toward beverage container litter reduction. These measures have consisted almost exclusively of manditory deposit legislation. For this reason, documented, actual, adverse effects of post-consumer solid waste reduction programs apply specifically to this sector, as do most detailed studies conducted to accurately predict such effects. While very narrow in scope, the above mentioned documentation and study results do provide a comparison between previous, unsubstantiated predictions of the results of such efforts and those which detailed studies and actual experience show to be expected.

Presented in this section shall be all predicted, adverse effects of post-consumer solid waste reduction efforts encountered in research for this thesis. Additionally, adverse effects shown to be expected by detailed studies or actual experience will be so identified as, in all likelihood, more credible than "top of the head" predictions. The reader may decide what level of confidence is appropriate for each predicted adverse effect.

Caution is advised in interpreting even the well based or documented adverse impacts as each study performed or actual experience documented was, to a greater or lesser degree, regional in nature. For

example, most reports of actual, documented effects of Oregon's mandatory deposit legislation consider only those internal to the state. The results of actions upon neighboring states or other regions of the United States are not usually considered.

Studies done for OSWMP such as Midwest Research Institute's <u>Resource and Environmental Profile Analysis of Nine Beverage Container Alternatives</u>(16), completed in 1974, consider effects on a world-wide basis and, hence, probably can not be directly interpolated for application to individual states or smaller regions. The reader is urged to bear in mind a recent statement by Mr. John R. Quarles, Jr., Deputy Administrator of EPA, "post-consumer solid waste reduction approaches, especially legislatively mandated approaches, imply adversity for some sector of the economy."(17) It is hoped that the reader will gain insight into the major areas of consideration in evaluating the adverse impacts of post-consumer solid waste source reduction efforts as a portion of a preliminary study which is advised in order to accurately assess the impacts upon the specific region or jurisdiction in question.

## 2.2 The Opposition

### 2.21 Groups in Opposition

At least two very well documented experiences which attempt to legislate post-consumer solid waste reduction exist. Both attempts consisted of mandatory beverage container deposit legislation. One, in Dade County, Florida, was unsuccessful in that it was rejected by the voters. The other, in the State of Oregon, was successful and

legislation was implemented.

The groups in opposition and the techniques used to successfully defeat the Dade County, Florida law are presented in some detail in a post-struggle report prepared to serve as a guide for future efforts.(18) Dade County, Florida beverage sales represent approximately 1% of total U. S. sales.(19) Knowing that successful legislation in such an area could set a precedent with far reaching effects, the beverage industry as a whole stood in opposition. Table 2 lists the financial contributors and the amounts of their contributions in opposition to the legislation.

A close examination of Table 2 highlights the obvious and raises some interesting questions. The first seven contributors are easily understood. They are those whose market situations, capital investment programs and operating costs would be most impacted by a major shift to glass, reusable containers, the expected result of such legislation. Glass manufacturers opposed the legislation because significant use of reusable glass beverage containers was expected to result in reduced sales volume due to multiple reuse vice a new container for each use.

Sources numbered 8, 9 and 10 in Table 2 are not so easily understood. The donation by auto manufacturers may be explained by their close association with the steel industry which is said to be strongly opposed to such legislation.(20) But, if this is the case, why were no donations received directly from the steel industry? The interest of real estate and vehicle rental concerns was and remains unexplained.

Of particular significance in Table 2 is the very small contribution included in source 11, unidentified. This source included

TABLE 2

DADE COUNTY FLORIDA CONSUMER INFORMATION COMMITTEE* DONATIONS

| | Source | Amount Donated | Percent of Total |
|---|---|---|---|
| 1. | Soft Drink Bottlers | $25,250 | 16.8 |
| 2. | Brewers | 6,300 | 4.2 |
| 3. | Beer Wholesalers | 44,000 | 29.3 |
| 4. | Glass Manufacturers | 7,500 | 5.0 |
| 5. | Packaging Manufacturers | 13,860 | 9.2 |
| 6. | Beverage Related Concerns | 22,870 | 15.3 |
| 7. | Food Handling Concerns | 7,250 | 4.8 |
| 8. | Real Estate Rental Concerns | 3,000 | 2.0 |
| 9. | Auto Manufacturers | 15,550 | 10.4 |
| 10. | Vehicle Rental Concerns | 4,000 | 2.7 |
| 11. | Unidentified | 460 | .3 |
| | Total | $150,040 | 100.0 |

*The Dade County Consumer Information Committee was the organization established by the various interests in opposition to the proposed legislation.

Source: Summary Report, Dade County Bottle Ordinance(21)

donations by private citizens who, in reality, were the group which decided the issue at the ballot box. It was this group that those for and against the legislation were attempting to convince by their respective arguments.

Of the total amount collected to be used in the fight to defeat the proposed legislation in Dade County, Florida, 23% came from within the county. Donations from out of state constituted 44% of the total.(22) The issue was far more than a purely local one.

While no report of the relative level of opposition to the Oregon State law has been located (this confrontation was state-wide and data is therefore presumably much more difficult to obtain), at least one report indicates the same basic group of opponents as was observed in Dade County, Florida.(23) Additionally, an article in a recent issue of Resource Recovery magazine, which was written by Mr. R. T. Willson, Executive Vice President of the American Iron and Steel Association, is very critical of the Oregon law, suggesting that costs far outweigh benefits and that resource recovery is the more desirable path to follow.(3) This article seems to be less than an unbiased appraisal and gives the impression that it may have been written in an attempt to advance other than the public interest.

It seems apparent that efforts to legislate post-consumer solid waste reduction, no matter what the target, will be opposed by some sectors of business and industry. Experience shows that if the region in question has a heavy representation of potential opponents to various types of legislation, such as minimum deposit, reduced total packaging, etc., the likelihood of success is greatly diminished.

### 2.22 Techniques Used

2.221 Public Influence. If legislation is to be approved or disapproved by elected representatives, as will usually be the case at the state level, there will undoubtedly be a heavy reliance placed upon the effects of lobbies by the opposition. In the event, however, of a public referendum, primary reliance will probably be placed upon the media as was the case in Dade County, Florida. Table 3 is a breakdown of the expenses of the opposition organization in the Dade County, Florida instance which shows a heavy reliance on mass media.

TABLE 3

DADE COUNTY FLORIDA CONSUMER INFORMATION COMMITTEE* EXPENSES

| Expense | Amount Expended | Percent of Total |
|---|---|---|
| 1. Advertising Agencies | $48,271.36 | 35.5 |
| 2. Printing and Mailing | 33,887.74 | 24.9 |
| 3. Newspapers | 22,091.58 | 16.2 |
| 4. Television | 17,301.43 | 12.7 |
| 5. Radio | 14,503.38 | 10.7 |
| Total | $136,055.49 | 100.0 |

*The Dade County Consumer Information Committee was the organization established by the various interests in opposition to the proposed legislation.

Source: Summary Report, Dade County Bottle Ordinance(21)

Expense number 1 was the cost of the commercial advertising agencies which conducted the successful opposition effort. The opposition consisted primarily of a heavy effort during the final two weeks prior tó the vote. It was so extensive and the time remaining before referendum so short that the proponents of the legislation could not successfully counter.(19) In addition to mass media, the opposition blanketed retail beverage outlets with posters, bottle inserts, in-store stickers and signs.(24) Their principle argument was that consumer cost would increase and this apparently swayed the voters.

The lesson to be learned here is that all possible arguments, both for and against post-consumer solid waste reduction, must be anticipated and addressed honestly, particularly those relating to consumer costs. Preparations must be made to counter a "blitz" effort immediately prior to referendum or perhaps to mount a similar effort on the part of the proponents. Stated in the previously referred to Dade County Bottle Ordinance Summary Report was the fact that the proponents of the legislation had, as their greatest resource, people; while the opposition had money. Planning should be done to fully utilize the most plentiful resource.(25)

2.222 Legal Challenges. In the earlier instances, legislative or voter approval of post-consumer solid waste reduction legislation, primarily manditory deposit requirements, did not totally open the way to implementation. Legal challenges followed in an attempt by opponents to block these programs.

After passage of the Oregon law, the American Can Company brought suit in the Oregon Circuit Court against the Oregon Liquor Control Commission (OLCC) seeking a declaratory judgment that the law was unconstitutional. They also sought an injunction restraining the OLCC from enforcing the statute. The plaintiffs included can manufacturers, brewers, canners, and soft drink manufacturers. The argument was that the law was unconstitutional because it violated:

(A) the commerce clause of the U. S. Constitution by placing an undue burden on interstate commerce;

(B) the equal protection clause of the U. S. Constitution and the privileges and immunities clause of the Oregon Constitution;

(C) the due process clause of the U. S. Constitution.(23)

The law was sustained by the court and affirmed upon appeal to the Oregon Court of Appeals.(26)

Several lessons are to be learned from the above. In terms of legal opinions, generalizations are very risky. Specifically, the Oregon law was found not to violate the U. S. Constitution on the grounds alleged. Other, differently worded or directed laws will undoubtedly be tested on similar grounds and the outcome will be based, to the extent the court feels appropriate, upon previous decisions; but the outcome is by no means certain. Additionally, state constitutions have a significant bearing upon interpretations. Laws not in violation of the United States Constitution may be challenged on the basis of state constitutions. Legal positions must be thoroughly researched.

## 2.3 Philosophical Argument

The inadvisability of government interference in the marketplace has been expounded upon since there was a government. Historically, such actions have been justified only if required to protect the welfare of the people or in times of great need such as depressions or wars. Even after hard evidence had been found that cigarette smoking is hazardous to the health, government intervention was limited to a requirement for such a warning on cigarette containers and a ban on television advertising. It is not difficult to understand objections to such intervention on the basis of cost to governments, resource conservation or energy conservation.

A common argument is to allow the market to determine demand for various types of products, packaging and convenience items. A question which must be addressed is whether consumers buy products because they are in the marketplace or whether products are in the marketplace because consumers buy them. There is evidence that in some locations in the United States, the free market system does not function as idealists believe it does. In Dade County, Florida no major brands of beer are sold in returnable bottles. Store managers, when questioned, stated either that they did not know that the specific product was available in returnable containers or that lack of shelf and storage space prohibit the handling of returnables.(27) Attempts to locate beverages in all-aluminum cans in Allegheny County, Pennsylvania will often end in frustration. Such conditions may not be as the result of consumer preference but as a result of retailer or wholesaler preferences. The

reader will have to come to grips with the philosophical arguments against government "meddling and interference" and reach his own conclusions in his specific instance as to whether or not to stop here and attempt voluntary programs only. It seems that such protests rarely come from consumers or consumer groups.

## 2.4 Increased Consumer Cost

### 2.41 Minimum Deposit Legislation

A major argument during consideration of Oregon's Minimum Deposit Law was that it would result in increased consumer cost. Lofty ideals about environmental enhancement, resource and energy conservation and litter reduction are all very nice; but if strong consumer support is desired, effects on consumer cost must be minimal or to the consumer's advantage.

In its Second Report to Congress on Resource Recovery and Source Reduction, prepared in 1974, OSWMP predicted that mandatory deposit legislation would result in slightly reduced average consumer prices for beer and soft drinks. The price of beverages in refillable containers was predicted to increase slightly over current levels due to transportation, handling and equipment change costs; but is was estimated that the stabilized price level would be approximately one-half a cent per unit lower than the then current average price due to reduction in the use of the more expensive disposable containers.(28)

More recently, OSWMP has stated that savings in the range of 3 to 5 cents per 12 ounce refillable container of beer or soft drink over

non-returnable containers have been observed.(29) There was some question as to whether or not the above savings were based upon retail costs which included handling and transportation expenses, estimated by EPA as 1 to 2 cents per container; but even if these are added, the resultant consumer cost remains 1 to 4 cents below that for the same product in non-refillable containers.(29) In the same document EPA pointed out that a rapid transition to returnables would result in significant requirements for new capital expenditures in the beverage industry and that these costs would almost certainly be passed on to the consumer. A slower transition was suggested to allow full depreciation of existing equipment prior to end of service.

Consumer prices on all types of beverages in Oregon were expected to increase as a result of the Oregon legislation.(30) Studies state that the true effect of the Oregon law on consumer cost has been muddled somewhat by the effects of general inflationary pressures.(30,31)

Table 4 presents information on the consumer cost of various beverages in Oregon and Washington, a state with no minimum deposit legislation, both before and after the implementation of the Oregon law. The State of Washington was chosen for comparison due to similar pre-law market conditions and product availabilities. Examination of Table 4 will show that beer prices have increased more in Oregon than Washington and soft drink prices have increased less since the Oregon law was implemented. It would appear to be extremely difficult to draw any firm conclusions from the information presented in Table 4 except, perhaps, that claims of significant price changes, either up or down, do not seem to be justified by the data.

## TABLE 4

## RETAIL BEVERAGE PRICES IN OREGON AND WASHINGTON BEFORE AND AFTER IMPLEMENTATION OF THE OREGON LAW

| | Oregon | Washington |
|---|---|---|
| Western Beer | | |
| Pre-law price | $1.11 | $1.17 |
| Post-law price | $1.24 | $1.21 |
| Percent change | 11.7% | 3.4% |
| National Beer | | |
| Pre-law price | $1.26 | $1.30 |
| Post-law price | $1.37 | $1.32 |
| Percent change | 8.7% | 1.5% |
| Soft Drink | | |
| Pre-law price | $.92 | $.92 |
| Post-law price | $.99 | $1.03 |
| Percent change | 7.6% | 11.9% |

Note: Prices shown are for 11 or 12 ounce six-packs.

Source: The Economic Impact of Oregon's "Bottle Bill"(32)

A recent detailed study which was completed to evaluate the possible impacts of minimum deposit legislation in the State of New York predicts annual consumer savings on beverage purchases of some $40 million.(33)

Without exception, the studies researched, which dealt with minimum deposit legislation, predicted decreased consumer cost. The Oregon experience indicates that such predictions must be made carefully due to the many other factors which may have an impact upon consumer beverage cost. This is one more reason for a carefully thought out study prior to legislation or other action.

### 2.42 Packaging Tax

In 1972, EPA conducted a study which, among other things, investigated the effects upon consumer cost of a unit tax on containers. EPA found that a unit tax on containers will result in retail cost increases equal to the amount of the tax. The unit tax provides no real incentive to reduce container size or weight since the tax is a set amount per container irrespective of bulk.(34)

A later study conducted for EPA examined in detail the specific effects of both a "penny-a-pound" type tax and a unit tax on packaging. Findings indicated that the packaging weight based tax would tend to reduce the quantities of packaging used for consumer products but not significantly at low levels.(35) A ten dollar per ton tax would result in approximately a 1% reduction in packaging. The relationship is nearly linear as the tax rate increases.(36) Table 5 indicates the cost to the consuming public of various levels of the "penny-a-pound" type

tax on packaging. Once again, the net cost change as a result of this type of tax is predicted to be an increase in consumer cost.

TABLE 5

TOTAL CONSUMER COST INCREASE IN THE UNITED STATES WITH VARIOUS LEVELS OF TAXES ON THE WEIGHT OF PACKAGING

| Tax Rate ($/Tonne* of Packaging) | $10 | $22 | $50 | $100 |
|---|---|---|---|---|
| Estimated 1970 Total Consumer Cost Increase (Millions of Dollars) | $274 | $598 | $1338 | $2599 |

*1 Tonne = 1000 kg.

Source: An Evaluation of the Effectiveness and Costs of Regulatory and Fiscal Policy Instruments on Product Packaging (37)

This same study concluded that a unit tax on packaging would tend to reduce the quantities of rigid packaging materials used for consumer products. (38) Since the tax would be a per unit tax, the only real result would be less of a tendency toward such practices as putting bottles in paper wrapping and then into a box. This would presumably be taxed as three containers. Table 6 shows the relationship between a one cent per unit tax and a tax based upon packaging weight using average weight consumer containers. The one cent per unit tax converts to significant rates on a per weight basis.

TABLE 6

EQUIVALENT TAX PER TONNE*
OF A ONE CENT PER CONTAINER TAX

| | |
|---|---|
| Rigid Paper | $398.12 |
| Rigid Plastic | 206.51 |
| Glass | 36.73 |
| Steel | 90.17 |
| Rigid Aluminum | 133.45 |

*1 Tonne = 1000 kg.

Source: An Evaluation of the Effectiveness and Costs of Regulatory and Fiscal Policy Instruments on Product Packaging (39)

The net effect of the unit tax on packaging was once again predicted to be an increase in consumer cost, the total magnitude of which is shown in Table 7.

No hard data is as yet available to accurately evaluate the actual effect of the various types of taxes proposed to reduce post-consumer solid waste, but all studies researched on this subject predict consumer cost increases even after considering the expected reduction in product cost due to decreased packaging. The tax, in general, will be passed directly on to the consumer.

The viability of a measure which begins with an expected rise in consumer cost is questionable. Of all the alternatives researched for post-consumer solid waste reduction, the tax on packaging seems most likely to unite the consumer with business and industry in opposition.

TABLE 7

TOTAL CONSUMER COST INCREASE IN THE UNITED STATES WITH VARIOUS LEVELS OF TAXES ON UNITS OF PACKAGING

| Tax Rate (Cents Per Container) | .5 | 1.0 | 1.5 | 2.0 |
|---|---|---|---|---|
| Estimated 1970 Total Consumer Cost Increase (Millions of Dollars) | $1652 | $3160 | $4685 | $6200 |

Source: An Evaluation of the Effectiveness and Costs of Regulatory and Fiscal Policy Instruments on Product Packaging(40)

### 2.43 Increased Product Durability

The effects of increased product durability upon consumer cost are generally considered to be obvious. For example, an automobile guaranteed to provide acceptable service for a period of time twice that which is currently experienced almost certainly will cost the consumer more initially. In fact, to some extent, the market currently offers such options to consumers in many product lines. For example, a top quality steel belted radial tire can be purchased for about $55, while a top-of-the-line bias ply tire costs about $45. A $55 radial guaranteed for 40,000 miles costs about $.0014 per mile. A $45 bias ply tire may last 30,000 miles and costs between $.0015 and $.0018 per mile or about $4 to $16 more per 40,000 miles than the radial.(41) It should be noted that the above analysis does not consider the time value of money. The guarantee of increased product durability is a key provision of this type of approach. The trend seems to be toward the

longer life item in this case, but no generalization can be made.

In general, some post-consumer solid waste reductions can result from efforts in this area, but major consumer education efforts will undoubtedly be required. The slightly reduced cost per unit of time in use must be weighed against sometimes significant increases in initial cost. In order for consumer comparisons to be made, the facts must be available and some period of service guaranteed.

### 2.5 Decreased Consumer Convenience

The argument of decreased consumer convenience has been used almost solely as relates to proposed packaging controls and primarily in connection with beverage container legislation. Simple logic will indicate that under most actions with the exception of outright bans on various types of packaging, such as individually wrapped slices of cheese or containers under some minimum allowable size, the level of consumer convenience available will not decrease; it will merely cost more. The only real difference between returnable and non-returnable beverage containers is that it costs money to throw one away, and the other can be disposed of at no personal cost. Some consumers seem willing to pay the increased cost of convenience as indicated by the fact that during the first year of the Oregon law, consumers forfeited over $300,000 in beer container deposits alone.(3)

More important than the packager's or the retailer's impression of the effect of various actions upon consumer convenience is the actual feeling held by the consumer. A post-law consumer survey conducted in

Oregon indicated that the minimum deposit law was viewed, by the consumer, as no inconvenience by 87 percent of those surveyed. Additionally, of the 13 percent who found the minimum deposit law to be inconvenient, over one-third felt that the benefits of the law outweighed the inconvenience. Only 5 percent of those surveyed disapproved of the law.(42)

In general, and with the exceptions noted previously, decreased consumer convenience is not likely to result from actions to reduce post-consumer solid waste. A valid argument can be made for an increase in the cost of consumer (and, incidentally, retailer, wholesaler and producer) convenience.

## 2.6 Employment

### 2.61 Employment Reduction

Most suggested methods to reduce post-consumer solid waste have been met with dark predictions of tremendous impact upon employment. The packaging industry appears to be the major sector in question and for good reason. Almost all legislation suggested to date has been intended to reduce the amount of packaging of one or all sorts which reach the solid waste stream. It seems logical that reductions in quantities of packaging manufactured must also mean reductions in the total numbers of people employed in packaging manufacture.

A reduction of 60,500 employees in beverage packaging industries (based upon 1969 figures) was predicted to be the result of a nationwide shift to all-refillable beverage containers by Research Triangle Institute (RTI) in 1972.(43) At the same time, RTI predicted an increase in

employment in beverage related industries of 60,800 employees. The net effect of a nationwide shift to all-refillable beverage containers was predicted to be an increase of 300 jobs. RTI did point out, however, that the large shifts would undoubtedly result in some temporary unemployment.

In a 1975 publication, OSWMP refers to the above figures and points out that the newly created jobs would probably be of a lower skill level than those lost, but that unemployment is higher among the less skilled.(44) OSWMP also points out that a 5 year transition to a 90 percent reduction in non-refillable beverage container use would result in a reduction of only 39,000 positions, vice the 60,500 previously referred to, and a 10 year transition in 17,000 lost positions. OSWMP and EPA endorse the gradual shift over the very abrupt shift evaluated by RTI.(45)

A study conducted by the Task Force on Critical Problems for the New York State Senate, published in 1975, predicts that a manditory deposit on all beer and soft drink containers in the state of New York would provide a net additional 4,007 jobs in the state with an increased annual payroll of about $35 million annually.(33) Table 8 provides a breakdown of these figures. The closure of some small independent bottlers was predicted.

The actual economic impacts of the Oregon minimum deposit law were evaluated approximately one year after the law had taken effect. A very strong shift to returnable containers had already taken place. Table 9 summarizes the employment effects of the Oregon law. Not included in the study was the effect upon employment in industries

## TABLE 8

## IMPACT UPON EMPLOYMENT IN THE STATE OF NEW YORK OF MINIMUM DEPOSIT LEGISLATION

| Sector | Employment Change | Annual Payroll Change (Millions of Dollars) |
|---|---|---|
| Brewers | +90 | +1.0 |
| Soft Drink Bottlers | +2766 | +30.0 |
| Malt Beverage Wholesalers | +512 | +6.0 |
| Can Manufacturers | -782 | -10.6 |
| Glass Manufacturers | -437 | -5.0 |
| Retailers | +1858 | +13.4 |
| Totals | +4007 | +34.8 |

Source: No Deposit, No Return--A Report on Beverage Containers(46)

## TABLE 9

## OPERATING EMPLOYMENT EFFECTS OF THE OREGON "BOTTLE BILL"

| | | |
|---|---|---|
| Production Labor | Decrease | (350) |
| Truck Driving | Increase | 140 |
| Warehouse and Handling | Increase | 575 |
| Total Employment | Increase | 365 |

Source: The Economic Impact of Oregon's "Bottle Bill"(47)

supplying the required new capital equipment or in administrative and clerical positions. The total increase in annual payroll as a result of the new positions was estimated to be $1,600,000.(47)

Both predictions and actual experiences with programs to reduce post-consumer solid waste to date indicate no new reduction in employment. The potential, however, is there; and this area deserves special interest in pre-program planning. It also must be remembered that the figures quoted above are summaries over large regions and that problems of unemployment could result in certain localities.

### 2.62 Employment Dislocation

Reference to tables 8 and 9 previously presented will indicate that employment dislocation is likely to result, and, in fact, has resulted from minimum deposit legislation. All resources reviewed which discuss the effects upon employment of actions to reduce post-consumer solid waste predict employment dislocations. For example, a shift to longer-lived consumer durables, such as automobiles or appliances, would probably result in fewer employees in the manufacturing process and more in the service and repair areas. If employees are unwilling or unable to be relocated, some change in unemployment rolls will result. As shown previously, total numbers of unemployed are not expected to rise, but the names could and probably would change. The effect upon specific small regions could be significant and deserves special consideration at local and county levels in particular.

## 2.7 Reduced Tax Revenues

The effect of a specific action intended to reduce post-consumer solid waste upon tax revenues of all levels of governments is primarily conditional upon (a) the effect upon employment and hence earned income; (b) the resultant tax write-offs available to industry and commerce as a result of accelerated capital obsolescence and new capital requirements; and (c) the resultant change in sales volumes as impacts upon state and local sales taxes. Once again, actual experience is limited to the effect of minimum deposit legislation.

EPA estimates that most tax losses will occur during the period of transition following enactment of post-consumer solid waste reduction laws or policies, but tax losses will eventually level off as employment dislocations take place and new plant equipment is purchased. A national minimum deposit law is estimated to result in a tax revenue loss total of $803 million for the first year, based upon total elimination of beverage can production and an 8 percent decline in beverage sales.(28) Taxes of various kinds on packaging could reasonably be expected to result in increases in tax revenues to the taxing authority.

In the specific instance of the Oregon minimum deposit law, income tax revenue, sales tax revenue and excise tax revenue were found to be not visibly affected after the first year of the law's implementation.(48)

Lack of detailed studies of the impacts of various post-consumer solid waste reduction policies and laws on the tax revenues of the several levels of government is puzzling. It appears that studies have

been completed primarily to counter the previously discussed adverse effects with little concern for the impact on government tax revenues. It must be noted that specific taxing authorities which depend heavily on a single industry, such as a small city with a large beverage canning plant, could be very seriously affected by specific measures. This is but another reason for interest and planning at all levels of government.

## 2.8 Reduced Economic Viability of Resource/Energy Recovery Plants

The packaging industry in general has taken the position, as discussed previously, that the trend toward resource/energy recovery is the answer.(3) There seems to be a very general concern on the part of strong advocates of resource/energy recovery that any program, which would substantially reduce the volume of, or change the makeup of, post-consumer solid waste, would adversely impact upon the economic viability of resource/energy recovery. Such apprehension was admitted to by Mr. Donald Berman, Allegheny County Works Director during an interview conducted as part of the research for this thesis.(20) Arguments directed toward reduced work in the field of post-consumer solid waste reduction, due to the fact that investments have been made in resource/energy recovery facilities, are as viable as ending research to eliminate the cause of a disease because hospitals have been built. The two should and can go hand-in-hand. As will be discussed later, the potential benefits of post-consumer solid waste source reduction are too great to be ignored.

A study prepared by EPA in 1974 gives an indication of the effect upon the composition of the waste stream which probably would have resulted from a total shift to refillable bottles for beverages in 1972. Table 10 presents a summary of such effects.

TABLE 10

CHANGES IN THE COMPOSITION OF THE POST-CONSUMER WASTE STREAM WHICH WOULD HAVE RESULTED FROM A TOTAL SHIFT TO REFILLABLE GLASS BEVERAGE CONTAINERS IN 1972.
(All Figures in Millions of Tons)

| | Beverage Container Materials Used in 1972 | Beverage Container Materials Which Would Have Been Used in an All Returnable system in 1972 | Materials Which Would Not Have Entered 1972 Waste Stream |
|---|---|---|---|
| Aluminum | .5 | -- | .5 |
| Steel | 2.0 | -- | 2.0 |
| Glass | 6.2 | 2.5* | 3.7 |
| Total | 8.7 | 2.5 | 6.2 |

*Assumes 10 "trips" for each refillable glass container.

Source: Energy Conservation Through Improved Solid Waste Management (49)

In a 1974 Solid Waste Management Strategy paper, OSWMP stated that analysis shows that the critical parameter in resource/energy recovery system feasibility is the price to be received from the fuel component of waste (about $12 in good market conditions) while the revenue from materials is quite low at about $2.50 per ton of input.(50) The conflict, says EPA, is more apparent than real. EPA also asserts that

waste reductions as high as the most optimistic estimate of 30 percent will not be adequate to result in a lower total post-consumer solid waste generation in 1985 than in 1975, and that resource/energy recovery will not be affected.(51)

A Washington Post editorial of April 2, 1975 justifies the previously stated position on the apparent conflict between waste reduction and resource/energy recovery and, said in part:

> Well, resource recovery and recycling is a fine idea, and we don't belittle the approach. But if the efficiency of recovery centers must rely on the maintenance of high volumes of trash, taxpayers may indeed wonder where this logic gets them. Does it make sense to design systems to accomodate wasteful... practices, or shouldn't the amount of waste be cut first?(51)

## 2.9 Increased Resource/Energy Use

This topic will be covered in more detail in a later section of this thesis dealing with the benefits of post-consumer solid waste reduction programs; but a review of the Dade County, Florida experience shows that arguments of increased resource and energy utilization as a result of a shift to returnable containers were used. Brief mention will be made here to give the reader an idea of the kind of argument which may be expected.

The opposition argument in Dade County, Florida dealt specifically with increased water and energy requirements for the washing of refillable bottles. Newspaper ads spoke of an additional 291 million gallons of water a year and enough electricity to light 10 million 100 watt light bulbs for the same year as the annual "waste" required to use returnable bottles.(52) These figures do not consider overall impacts

but only a portion of the total effect of a shift to returnables and are, therefore, misleading. They do, however, indicate the possible magnitude of the impact in isolated situations and the types of problems which could result in specific municipalities. The overall impact may well be less water and energy used state-wide or county-wide for the new system, but the water and energy resources of specific municipalities may be strained.

# 3.0 THE CASE FOR POST-CONSUMER SOLID WASTE REDUCTION

## 3.1 Introductory Comments

In this section, the major types of benefits to be experienced from post-consumer solid waste reduction, in general, will be discussed. No major attempt will be made to quantify the benefits expected, as the quantity of each which might result depends upon the type of specific action taken.

As previously noted, the reduction of wastes generated has been a stated goal in Federal Solid Waste Legislation since Public Law 89-272, the Solid Waste Disposal Act of October 20, 1965. During an interview conducted as research for this thesis, Mr. Michael Laube of EPA's OSWMP stated that real interest in this concept at the Federal level began in early 1973 after then President Nixon called for increased emphasis on waste reduction in his environmental message of late 1972.(45)

Some state officials had also become more than mildly interested in waste reduction by 1973. In an article published in the APWA Reporter of May 1973, Mr. Grant J. Merritt, Executive Director of the Minnesota Pollution Control Agency said:

> In addition to looking at recycling as a way of reducing both the amounts of solid waste discarded and the drain on natural resources, we must begin to seek ways to minimize the amounts of solid waste created. We must begin to identify unnecessary consumption and creation of solid waste rather than to simply plan for growth... If necessary, government should seek ways to minimize the amounts of solid waste being created through such mechanisms as bans on non-returnable beverage containers, restrictions on packaging, taxes based on length of product life.

> Once we have succeeded at minimizing the amounts of natural resources used and solid waste created, then we should attempt to recycle the remainder.(53)

While not stating so specifically, the examples of governmental actions and controls suggested by Mr. Merritt indicate that his focus is primarily upon post-consumer solid waste, the portion of the total waste stream the disposal of which is and has, for some years, been considered a responsibility of government.

In its Third Report to Congress on Resource Recovery and Waste Reduction, EPA's OSWMP made clear the fact that its focus in waste reduction was to be upon post-consumer community solid wastes.(54) The reason for this focus was probably that reduction of the post-consumer solid waste portion of the total waste stream would pay the greatest dividends by favorably impacting upon environmental enhancement and natural resource conservation while, at the same time, reducing the tremendous economic burden of local governments.

Attempting to change the behavior patterns of the American people has been recognized from the outset as no easy task. In a paper presented at the 1975 Conference on Waste Reduction, Mr. John R. Quarles, Jr., Deputy Administrator of EPA, said:

> Waste reduction is a radical concept. We might as well recognize that at the outset. It means basic change in our ways of approaching day-to-day activities. In that sense it is analogous to other environmental, safety and other issues. Air and water pollution control, noise regulation, Federal supervision over food and drugs, and transportation safety requirements--these and many other departures from a simpler time all were equally radical once, but they are now well accepted requirements of our society. Waste reduction also is radical--but no more so than the other activities that I have mentioned.(55)

In the remainder of this section, the general benefits which prompted the adoption of this "radical" concept will be discussed.

## 3.2 Resource/Energy Recovery, Good but Not Enough

### 3.21 Projected Growth of the Post-Consumer Solid Waste Stream

Past attempts to predict the growth of the post-consumer solid waste stream have been clouded by insufficient data concerning historical generation quantities. More current estimates of amounts of post-consumer solid waste to be disposed of have recently been reviewed by EPA in an effort to develop accurate base line data for further studies.(56) As a result, much better estimates of actual quantities generated have recently become available. Table 11 presents the most recent EPA estimates of post-consumer solid waste generation. The reader familiar with previous estimates of post-consumer solid waste generation will notice that these new figures published by EPA represent a significant reduction from previous estimates.

TABLE 11

U. S. BASELINE POST-CONSUMER SOLID WASTE GENERATION PROJECTIONS, 1971-1990

| | Estimated | | | Projected | |
|---|---|---|---|---|---|
| Total Gross Discards | 1971 | 1972 | 1980 | 1985 | 1990 |
| Million tons per year | 133 | 144 | 175 | 201 | 225 |
| Pounds per person per day | 3.52 | 3.75 | 4.28 | 4.67 | 5.00 |

Source: Third Report to Congress(57)

### 3.22 Constraints to Resource/Energy Recovery Facilities

Implementation of a capital intensive resource/energy recovery program may not be economically feasible in all locations as will be shown in this section. In order for resource/energy recovery to be a viable waste disposal alternative, certain minimum waste generation, which is usually directly transferrable to population levels, must be guaranteed, and a market must be available for the processed waste and reclaimed materials. As noted previously, a market for combustible waste is most critical as income from supplementary fuel sales represents a major portion of total income from material sales.

A study conducted by EPA in 1974 concluded that in order to achieve economies of scale, currently available resource/energy recovery systems must be assured of 200 to 250 tons per day of post-consumer solid waste input.(58) To generate the above quantity, a population of about 100,000 persons is typically required, assuming each person generates 3.75 pounds per day (Table 11) and that the plant operates five days per week.

Also of major importance is the availability of land disposal sites. Resource/energy recovery, in most cases, must compete with the next lowest cost alternative method of disposal. With some exceptions, such as Allegheny County, Pennsylvania (with numerous strip mined areas available) most large metropolitan areas find land within a reasonable haul distance, reasonable as determined by the summation of all cost factors, quite expensive.

The market for supplemental fuel is very uncertain as indicated in EPA's Third Report to Congress on Resource Recovery and Source Reduction.(59) The high and low estimates of supplemental fuel market value were reported by EPA in 1975 to be $16 and $3 per ton of raw waste processed. While price stability in a specific area can usually be predicted and a market may be found, it seems obvious that favorable conditions for resource/energy recovery in one location, on the basis of income from shredded fuel, do not necessarily imply applicability in all areas of equal size.

Of lesser importance than the market for supplemental fuel, but nonetheless of some importance in establishing the viability of a resource/energy recovery facility, is the market for reclaimed metals. As part of a study conducted for EPA in 1975, Midwest Research Institute (MRI) reported on past and predicted markets for ferrous and aluminum scrap. MRI found that the market for clean aluminum scrap, presuming it was in a location where it could be reprocessed, was virtually unlimited.(60) Such was not the case for ferrous scrap as shown in Table 12. The amount of ferrous scrap which can be reclaimed during any year depends upon the specific steel making process in use and upon the products being manufactured. MRI considered the processes in use in 1975 and expected to be in use at various points in time until 1990 in estimating the total United States demand for ferrous scrap.

Table 12 indicates some definite limit to the market for ferrous scrap which is considerably less than annual steel production. It can also be seen from Table 12 that the demand for ferrous scrap is not expected to increase significantly through 1990. At some level of

recovery of annual production, about 17 percent, the demand for purchased scrap is exhausted. It should also be noted, however, that even the more optimistic predictions of implementation of resource recovery by 1990 do not indicate that demand for purchased ferrous scrap will be met.(61)

TABLE 12

FERROUS SCRAP DEMAND IN RAW STEEL PRODUCTION 1960 TO 1990 (Millions of Tons)

| Year | Total Production | Purchased Scrap Demands |
|---|---|---|
| 1960 | 99.3 | 18.8 |
| 1965 | 131.5 | 23.1 |
| 1970 | 131.5 | 22.9 |
| 1975 | 142.0 | 22.1 |
| 1980 | 155.0 | 23.4 |
| 1985 | 169.0 | 27.9 |
| 1990 | 184.0 | 31.8 |

Source: Base Line Forecasts of Resource Recovery, 1972-1990(62)

Markets for other reclaimed materials are only now beginning to be developed and are, as yet, highly unpredictable. For example the demand for wastepaper improved significantly in 1973 and early 1974 then reversed itself and dropped severely. By late 1974 prices had fallen to one-half to one-fourth of the levels of 6 to 9 months earlier.(63) Unstable markets for reclaimed materials have made long term commitments

for the purchase of such materials, generally required prior to the construction of capital intensive resource/energy recovery facilities, very difficult to obtain.

An additional problem in the marketing of reclaimed materials is the cost of transport. In a statement made in 1973 before the Senate Subcommittee on the Environment, Mr. Samuel Hale, Jr., Deputy Assistant Administrator for Solid Waste Management Programs, stated that evidence had been found which indicates that freight rate structures discriminate against some secondary materials relative to their competitive virgin material counterparts.(64) Table 13 indicates that such discrimination exists in the specific cases of steel scrap, glass cullet and reclaimed rubber. Similarly, discrimination can be said to exist in the cases of some secondary materials, specifically wastepaper and aluminum scrap.

After considering all of the above factors, EPA prepared a list of potential candidate areas for resource/energy recovery facilities in 1974. This list, included at the end of this thesis as Appendix A, was not intended to be a prediction of actual facilities to be constructed but only an evaluation of potential for such facilities. The total 1970 population of the listed SMSAs was 71,786,000.

TABLE 13

REVENUE - COST RATIO* FOR 500 MILE RAIL HAUL OF VARIOUS MATERIALS

| | Ratio | | Ratio |
|---|---|---|---|
| Iron Ore | 1.33 | Steel Scrap | 1.94 |
| Woodpulp | 2.59 | Waste Paper | 1.66 |
| Glass Sand | 1.45 | Glass Cullet | 1.94 |
| Natural Rubber | 1.96 | Reclaimed Rubber | 3.33 |
| Aluminum Ingots | 2.38 | Aluminum Scrap | 1.72 |

*Note: Ratio is railroad revenue for haul of one unit of material divided by cost.

Source: Statement Submitted by EPA to the U. S. Senate Subcommittee on the Environment(65)

## 3.23 Projections of Resource/Energy Recovery Capabilities

Recently, attempts have been made to accurately assess both the current and future maximum practical impact of resource/energy recovery. EPA estimated that the maximum practical potential of material recovery in 1973, as dictated by considerations discussed in the previous subsection, would have resulted in reclamation of 7 percent of iron, 8 percent of aluminum, 5 percent of copper, 3 percent of lead, 15 percent of tin and 14 percent of paper requirements for the same year.(66)

More recently, EPA has projected that by 1980, 29 resource/energy recovery plants would be in operation in the United States

processing about 18.5 million tons of post-consumer solid waste per year.(67) A listing of these facilities, based upon actual planning now in progress for facility construction, is included as Appendix B. In comparison to MRI's most likely estimate of post-consumer solid waste to be generated in 1980, 160 million tons, this will leave over 140 million tons of post-consumer solid wastes unprocessed, a figure in excess of current estimated total generation.(68)

MRI has also estimated that by 1990, 40 metropolitan areas in the United States will be operating some sixty centralized resource/energy recovery plants processing 49 million tons of post-consumer solid waste annually.(62) These plants are expected to recover 2.8 million tons of ferrous metal, .4 million tons of aluminum, .6 million tons of glass and .5 million tons of paper in 1990. The wastes expected to be processed by these resource/energy recovery operations will represent only about 25 percent of the 200 million tons of post-consumer solid wastes expected to be generated in that year.(62)

EPA estimated maximum possible energy savings which could have been attained in 1974 by post-consumer waste reduction alone at 115 thousand barrels per day of oil equivalent (B/DOE), by resource/energy recovery alone at 473 B/DOE, and at a total of 518 B/DOE if both post-consumer waste reduction and resource/energy recovery had been implemented to the maximum extent feasible.(69) Unfortunately, no clear description was given as to the types and extent of actions which would have resulted in these savings other than maximum possible implementation.

Table 14 presents a summary of EPA estimates of post-consumer solid waste generation and resource/energy recovery processing through 1990. As discussed previously and shown in Table 14, there is clearly an immediate need for action to reduce total disposal quantities in addition to resource/energy recovery and post-consumer solid waste reduction will shortly be proven to be a logical choice.

TABLE 14

U. S. BASELINE POST-CONSUMER SOLID WASTE DISPOSAL REQUIREMENT PROJECTIONS 1971-1990 (Millions of Tons/Year)

| | 1971 | 1973 | 1980 | 1985 | 1990 |
|---|---|---|---|---|---|
| Gross Discards | 133 | 144 | 175 | 201 | 225 |
| Resource/Energy Recovery | 8 | 9 | 19 | 35 | 58 |
| Net Waste Disposal | 125 | 135 | 156 | 166 | 167 |
| Expected Growth in Disposal Requirements Over 1971 | 0 | 10 | 31 | 41 | 42 |

Source: Third Report to Congress on Resource Recovery and Waste Reduction, U. S. EPA(57)

### 3.3 Reductions in Governmental Costs of Solid Waste Collection and Disposal

#### 3.31 Municipal Solid Waste Management Costs are Increasing

The costs to various levels of government for solid waste management can be spoken of in the major categories of collection costs and

disposal costs. For the purpose of this discussion, litter collection costs will be addressed separately.

In addition to the same inflationary trend faced by all sectors of the economy in recent years, municipal governments have been hard pressed economically in the area of solid waste management by new, strict environmental controls which have increased the costs of virtually all methods of solid waste disposal. Standards must be met with respect to sanitary landfill ground water effects, and incinerators are subject to strict air pollution regulations. Enormous pressure is being felt to move from cheaper but environmentally degrading open dumps to more costly sanitary landfills which require proper cover and other controls. Many open dumps are still in use across the United States, but they are in their "twilight" years. In most cases, as we shall see shortly, the cost of acquiring new land within a distance which can facilitate favorable haul costs for sanitary landfill operations is also increasing at an alarming rate.

It is by virtue of the very cost increases mentioned above that most resource/energy recovery operations have become economically viable alternative methods of solid waste disposal. There have, of course, been other pressures which have influenced the shift, but of major importance has been the costs of the more conventional alternatives.

### 3.32 Collection Costs

Collection is by far the most significant part of municipal waste management expenses.(70) In 1974, the collection of one ton of post-consumer solid waste cost the average city in the United States

$21, about 80 percent of the total collection and disposal cost.(71) From a national perspective, these average local cost figures imply a total direct cost of about $3.3 billion to collect the nation's 156 million tons, interpolated from Table 11, of post-consumer solid waste in 1975. This cost figure is probably low as inflation was not accounted for.

If a 4 percent annual inflation rate, modest by recent years' trends, is assumed, collection costs can be expected to increase by about 50 percent by 1985 to $30 to $35 per ton. Applying this per ton projection to the expected 1985 post-consumer solid waste generation figure from Table 11, 201 million tons, it can be seen that total post-consumer solid waste collection costs are expected to be between $6.3 and $7.0 billion for that year, as much as double the 1975 cost.

Resource/energy recovery programs do not contend that they will reduce collection costs. Whether land filled or processed, post-consumer solid wastes must first be collected.

Post-consumer solid waste reduction could reasonably be expected to reduce collection costs in the long term. Reduced quantities could eventually result in more efficient rerouting, fewer vehicle trips and therefore reduced collection costs. If local collection service is accomplished by contract and billed on the basis of actual weight or volume collected, not frequently the case but sometimes encountered (e.g. Plantation, Florida; Reston, Virginia(72)), immediate and more substantial savings could be expected. It seems illogical to ignore potential savings in the largest single cost area of post-consumer solid waste management, that of collection.

### 3.33 Disposal Costs

Most of the statements made in the previous sub-section concerning collection costs also apply to disposal costs but, since disposal costs consume only about 20 percent of the municipal post-consumer solid waste management budget, with reduced impact. Additionally, it must be moted that systems for resource/energy recovery reduce significantly the requirement for final disposal facilities.

Short run savings in disposal costs could be effected by post-consumer solid waste reduction, especially if disposal facilities are privately owned and costs are based upon weight or volume of waste disposed of. To a lesser degree, short run savings could also be expected in the case of municipally owned disposal facilities as a result of reduced labor requirements and equipment utilization.

Probably the greatest potential for savings in the disposal area lies in reduced utilization of existing landfill facilities and the subsequent extension of landfill life. In the past several years there has been a loud "hue and cry" of landfill capacity exhaustion. In its _1975 Municipal Yearbook_, the International City Management Association reported the results of a survey conducted to determine the true degree of landfill exhaustion being faced by cities in the United States. Table 15 presents a summary of these results. As can be seen from Table 15, 7 cities in 20 will have exhausted available landfill sites by 1979. The problem is particularly critical in the case of cities of over 500,000 people.

## TABLE 15

## REMAINING LIFETIME IN LANDFILLS

| Classification (Population) | No. of Cities Reporting | Remaining Lifetime, Years % of Cities Reporting | | | |
|---|---|---|---|---|---|
| | | Under 1 | 1-2 | 3-4 | Over 4 |
| All Cities | 754 | 5 | 17 | 11 | 67 |
| 500,000 up | 12 | 0 | 17 | 25 | 58 |
| 250,000-500,000 | 18 | 0 | 11 | 11 | 78 |
| 100,000-250,000 | 55 | 5 | 11 | 7 | 76 |
| 50,000-100,000 | 117 | 5 | 14 | 17 | 64 |
| 25,000-50,000 | 182 | 6 | 19 | 12 | 63 |
| 10,000-25,000 | 370 | 5 | 18 | 9 | 67 |

Source: The Municipal Yearbook, 1975, International City Management Association(73)

Midwest Research Institute has estimated that a city which purchased land 20 miles from the population center in 1973 for $3420 per acre, an average price for such land in Pennsylvania at the time, will pay $6490 per acre for the same land in 1980, $10,230 per acre in 1985 and $16,250 per acre in 1990.(74) EPA estimates that an 8 percent reduction in post-consumer solid waste generation could save, on a national average, between $70 and $90 million in disposal costs alone in 1985.(75)

### 3.34 Litter Collection Costs

Most efforts to date to reduce the post-consumer solid waste stream have been justified primarily as means of litter reduction. Litter reduction was the prime mover in the Oregon Minimum Deposit law and the attempted Dade County, Florida ordinance discussed previously. Unfortunately, reduced litter across-the-board or reducing particular components of litter may do little to directly reduce total litter collection costs, as was found to be the case in Oregon.(76) Table 16 shows the Oregon State expenditures for litter collection during the period July 1970 through January 1975. The minimum deposit law became effective on 1 October 1972.

Table 16 seems to indicate level funding for litter collection vice funding as required, which seems of little surprise, as most states do not fund total amounts required to provide 100 percent litter collection.

Certain post-consumer solid waste reduction measures, such as minimum deposit legislation, do, however, show potential for reducing the total quantity of litter generated, hence, total societal cost, even if not successful in reducing actual litter collection costs. The Oregon law was determined to have reduced total roadside litter generated by 39 percent on an item count basis and by 47 percent on a volume basis.(76) Presumably, this resulted in more litter cleanup coverage for the same cost and in reduced litter visibility in areas where litter cleanup was not accomplished.

## TABLE 16

## COST OF LITTER COLLECTION TO THE STATE OF OREGON, 1970-1975

| Fiscal Year | Total Expenditures | Average Monthly Cost |
|---|---|---|
| 1970-71 | $589,076 | $49,090 |
| 1971-72 | $550,393 | $45,866 |
| 1972-73 | $630,996 | $52,583 |
| 1973-74 | $591,795 | $49,316 |
| 1974 to 1 Feb. 1975* | $425,937 | $60,848 |

*Note: Costs during this period are not greatly different from similar periods in previous years. Expenditures are high during the summer months due to heavy reliance upon vacationing student labor.

Source: Oregon's Bottle Bill, Two Years Later(76)

### 3.4 Energy and Natural Resource Conservation

During the period between 1950 and 1971, the United States' demand for metals tripled and energy consumption doubled.(77) The average American consumes almost 3 times as much energy material and 2½ times as much metallic minerals as did a U. S. resident at the start of the 20th century. Annual demand for minerals is expected to increase to 2.5 times our present consumption by the year 2000.(78)

The above information is startling but not of major concern unless, as may be the case, reserves of the materials mentioned above are becoming exhausted. A study prepared by the National Commission on Materials Policy in 1973 concluded that the United States faces potential shortages of 6 of the 13 basic raw materials upon which it depends for industrial production. By 1985, the report predicted, we will rely on imports for 9 of those 13.(79) Some projections indicate that known reserves of lead and copper may be depleted in 50 years. Some fossil fuel supplies are also in jeopardy. It is estimated, for example, that natural gas reserves will be depleted in less than 25 years.(77)

Whether or not we are, in fact, rapidly reaching the end of the supply of some raw materials world-wide or nation-wide is, of course, important; but, regardless, conservation of energy and natural resources seems to be a prudent course of action to most rational persons. Post-consumer solid waste reduction will, by definition, reduce the energy and resource input into materials which enter the solid waste stream. Whether reductions of the post-consumer solid waste stream are made by reducing packaging, reusing packaging, increasing product durability or influencing public opinion to do without certain items, the net result must be reduced energy and resource utilization or such actions can not be classed as post-consumer solid waste reduction.

## 3.5 Reduced Environmental Degradation

In 1969, air pollution from industrial processes in the United States totalled an estimated 39.6 million tons, a 3.2 percent increase

over 1968. The increase in water pollutants annually produced between 1964 and 1968 was estimated at 8.1 billion pounds. 12 percent of these increases resulted from population growth and 88 percent from increased per capita consumption.(80)

Disposal of solid wastes may result in generation of air or water pollution. Incineration can generate air pollution. Sanitary landfilling can result in ground and surface water pollution. Improper disposal practices and littering result in environmental degredation through adverse aesthetic impact and undesirable vectors.

Post-consumer solid waste reduction can impact positively on the environment by reducing the amounts of products or product packaging produced and by reducing the total amounts of wastes disposed of. Granted that methods are available to reduce or totally eliminate the various types of pollution referred to above, but these methods are costly. While pollution reduction may not be a major selling point for post-consumer solid waste reduction programs, it is not likely that pollution generation will be utilized as an argument against such programs.

### 3.6 Favorable Impact on International Balance of Payments

The United States currently imports more than 90 percent of the aluminum and 80 percent of the tin used each year.(81) The United States does not possess commercial resource deposits of nickle and most of the higher grade deposits and more accessible sources of iron ore are largely depleted.(82) The relatively high price which must be paid

for oil imports is common knowledge. These are but examples of the annual dollar drain required to keep our economy functioning.

A large portion of the tin and aluminum imported each year is used in the manufacture of containers which are intended to be used once and then discarded. Resource recovery results in some reduced reliance upon imports as indicated in annual recycle quantities cited previously, but the potential impact is limited by the feasibility of resource/energy recovery facilities.

Post-consumer solid waste reduction could impact favorably, although probably not significantly, upon the United States international balance of payments.

# 4.0 SPECIFIC TARGETS FOR POST-CONSUMER SOLID WASTE REDUCTION

## 4.1 Composition of the Post-Consumer Solid Waste Stream

Information previously presented has shown post-consumer solid waste reduction to have potential as a means of reducing the impacts upon society of urban solid waste generation, collection and disposal. Discussion to this point has been very general in terms of the types of post-consumer solid waste which are to be reduced. It seems obvious that there may exist specific portions of the post-consumer solid waste stream, the reduction of which will be of more overall benefit or of less difficulty than others. There may, in fact, exist portions of the post-consumer solid waste stream which do not lend themselves to reduction at all.

In order to provide better information for all endeavors related to the post-consumer solid waste stream, OSWMP prepared, in late 1974, a very detailed listing of product-source categories for the 1973 post-consumer solid waste stream.(83) This listing, of great value in the logical selection of post-consumer waste reduction targets, is presented as Table 17. The extent of the estimated, 1973 level of recycling of the various categories is also indicated in Table 17.

Even more detailed data might be of use if available. For example, in 1968, Americans threw away 7.6 million television sets, many still working or in need of an inexpensive repair part.(84) With data of this nature, the benefits of some mechanism, such as a deposit, to encourage consumers to return unwanted television receivers to

## TABLE 17

## POST-CONSUMER SOLID WASTE GENERATION AND RECYCLE: DETAILED PRODUCT-SOURCE CATEGORIES, 1973 (Thousand Tons)

| Product-Source Categories | Gross Discards | Recycled (%) | Net Disposal Quantity | Net Disposal % of Total Waste |
|---|---|---|---|---|
| Durables | 14,700 | 2 | 14,400 | 11 |
| Appliances | 2,200 | 4 | 2,100 | 2 |
| Furnishings | 3,400 | 0 | 3,400 | 3 |
| Tires | 2,000 | 10 | 1,800 | 1 |
| Other | 7,100 | 0 | 7,100 | 5 |
| Non-Durables Except Food | 27,930 | 13 | 24,160 | 18 |
| Newspaper | 10,400 | 24 | 7,950 | 6 |
| Books, Magazines | 3,720 | 9 | 3,390 | 3 |
| Office Paper | 6,390 | 15 | 5,400 | 4 |
| Tissue Paper | 2,320 | 0 | 2,320 | 2 |
| Paper Plates & Cups | 600 | 0 | 600 | * |
| Other Paper Non-packaging | 1,300 | 0 | 1,300 | 1 |
| Clothing | 1,300 | 0 | 1,300 | 1 |
| Other | 1,900 | 0 | 1,900 | 1 |
| Packaging | 52,270 | 10 | 46,940 | 35 |
| Glass Bottles | 12,400 | 2 | 12,125 | 9 |
| Beer & Soft Drink | 6,100 | 3 | 5,910 | 4 |
| Wine & Liquor | 1,970 | 1 | 1,945 | 1 |
| Food & Other | 4,330 | 1 | 4,270 | 3 |

TABLE 17 (cont.)

| Product-Source Categories | Gross Discards | Recycled (%) | Net Disposal Quantity | Net Disposal % of Total Waste |
|---|---|---|---|---|
| Steel Cans | 5,650 | 1 | 5,590 | 4 |
| Beer & Soft Drink | 1,550 | 1 | 1,535 | 1 |
| Food | 3,140 | 1 | 3,105 | 2 |
| Other | 960 | 1 | 950 | 1 |
| Aluminum | 820 | 4 | 785 | 1 |
| Beer & Soft Drink | 440 | 7 | 410 | * |
| Other Cans | 50 | 2 | 45 | * |
| Foil | 330 | 1 | 330 | * |
| Paper & Paper Board | 28,230 | 18 | 23,270 | 17 |
| Corrugated | 15,100 | 22 | 11,810 | 9 |
| Paper | 6,925 | 15 | 5,880 | 4 |
| Other | 6,205 | 10 | 5,580 | 4 |
| Plastics | 3,090 | 0 | 3,090 | 2 |
| Containers | 510 | 0 | 510 | * |
| Other | 2,580 | 0 | 2,580 | 2 |
| Wood Packaging | 1,900 | 0 | 1,900 | 1 |
| Other Packaging | 180 | 0 | 180 | * |
| Total Non-Food | 94,900 | 10 | 85,500 | 63 |
| Food | 22,400 | 0 | 22,400 | 17 |
| Yard | 25,00 | 0 | 25,000 | 19 |
| Miscellaneous | 1,900 | 0 | 1,900 | 1 |
| Grand Total | 144,200 | 7 | 134,800 | 100 |

TABLE 17 (cont.)

*Less than .5%.

Source: Third Report to Congress on Resource Recovery and Waste Reduction (83)

retailers, instead of simply disposing of them could be evaluated. Perhaps, with increased emphasis upon post-consumer solid waste reduction, such increasingly detailed data will become available.

Table 17 shows that in 1973, 7 percent of the total post-consumer solid waste discard was recycled, primarily paper products. While no such specific argument was seen stated in source material, it appears that the items which are being recycled at rates of 10 percent or higher are materials which, by the nature of the method of generation, are available in a concentrated manner. Tires, recycled at a rate of 10 percent in 1973, are concentrated at retail outlets upon replacement. Office paper, recycled in 1973 at a rate of 15 percent, is also source concentrated. Paper and paperboard used in containers and packaging and recycled at a rate of 18 percent in 1973 is undoubtedly held at the retail and wholesale levels for sale for recycling. It seems reasonable to assume that the above materials never entered the post-consumer solid waste stream as a result of the market for concentrated quantities. This phenomena is important in the consideration of methods of post-consumer solid waste reduction.

As indicated in Table 17, the largest single category of post-consumer solid waste is containers and packaging, representing over one-third of the net waste disposal weight. Almost all items in this

category are single use items; they are used once, serve their purpose and are discarded. The concentration of early efforts toward post-consumer solid waste reduction upon this category of waste is easily understood.

Within the category of containers and packaging are beer and soft drink containers which represented almost 6 percent by weight of 1973 post-consumer solid waste. Remembering the day, not so long ago, when all such beverages were sold in returnable containers, it is no great surprise that early efforts toward post-consumer solid waste reduction have been concentrated in this area also.

Non-durable goods represented 18 percent of the 1973 post-consumer solid waste disposal problem. Included in this grouping are the many single use items such as paper plates, cups, napkins and other such convenience items. While such items as those just mentioned do not constitute a large portion of the total disposal weight, probably less than 3 percent, they do offer potential for reduction actions of some sort.

Durable goods constituted some 11 percent of total 1973 post-consumer solid waste disposal. This category of post-consumer solid waste presents the greatest collection and disposal problems due to size and weight and may offer the greatest potential for reuse or salvage. Many durable items are disposed of with useful life or salvagable parts remaining, as in the case of the television sets mentioned earlier. A very great problem in extending the life of durable goods is that of repair at a reasonable cost. Many durable goods are more inexpensively replaced than repaired in the sense of direct

owner cost.

Food and yard wastes, probably among the most difficult of all categories of post-consumer solid waste to reduce, represented about 36 percent of the total weight of post-consumer solid wastes disposed of in 1973.

The above mentioned categories of post-consumer solid waste shall be addressed in the remainder of this section as those which present the most universal problems in post-consumer solid waste management and, hence, offer the greatest level of benefit if reduction can be achieved. As mentioned previously, most efforts, taken to date, which might reasonably be expected to result in post consumer solid waste reduction have been directed toward packaging. For this reason, the true level of benefits expected from such efforts has been much more thoroughly studied in this specific area. None-the-less, a discussion will be conducted as relates, specifically, to each of the categories mentioned above.

A subsequent section will address the specific measures which may result in reductions in the quantities of post-consumer solid wastes generated; therefore, no in-depth discussion will be attempted in this section.

## 4.2 Containers and Packaging

### 4.21 Overall

Recent years have seen a tremendous growth in the consumption of consumer packaging. The consumption of food in the United States

increased by 2.3 percent by weight on a per capita basis between 1963 and 1971; while, during the same period, the tonnage of food packaging increased by about 33.3 percent and the number of food packages by an estimated 38.8 percent per capita.(85)

In the case of some specific items, per capita product consumption has declined while per capita consumption of packaging for the same product has increased. Examples of such activity are presented in Table 18.

TABLE 18

PRODUCT CONSUMPTION IN RELATION TO PACKAGING CONSUMPTION FOR SELECTED PRODUCTS 1958 to 1970
(pounds per capita)

| Product/Package | 1958 | 1970 | Percent Change |
|---|---|---|---|
| Dairy | | | |
| Product Consumption | 398.0 | 354.0 | -11.1 |
| Package Consumption | 10.6 | 13.3 | +25.5 |
| Cereals, Flour & Related Products | | | |
| Product Consumption | 150.0 | 140.0 | -6.0 |
| Package Consumption | .8 | .9 | +12.5 |
| Produce | | | |
| Product Consumption | 90.2 | 80.0 | -11.3 |
| Package Consumption | 5.3 | 7.3 | +37.7 |

Source: Packaging Source Reduction: Can Industry and Government Cooperate?(86)

The year of 1958 was chosen as the base year against which to measure increases in the use of packaging due to the fact that the "packaging explosion" is generally agreed to have begun in that year. A recently conducted study presents the significant increases in the consumption of the 6 most heavily used packaging materials during the period of 1958 to 1971. Table 19 presents the findings of this study.

These significant growth rates in the per capita consumption of packaging are not necessarily totally evil. At the First National Conference on Packaging Wastes conducted in 1971, Mr. C. Soutler Edgar, a member of the packaging industry, gave the following as the role of packaging:(88)

(A) To insure safe delivery of the product.

(B) To capture the initial attention of the consumer.

(C) To serve as a merchandiser and advertiser.

(D) To present the consumer with detailed product information and instructions.

Excluded from the above list but noted in other references are several other functions which undoubtedly have been most important in the recent growth of packaging.(89,90) Packaging has taken the place of the sales clerk in selling the product and even in preventing pilferage in the case of smaller items packaged on cards too large to be easily concealed. Increased packaging has allowed reduced labor in the handling and stocking of products. Non-refillable packages and containers offer similar benefits. The apparent demand for consumer convenience has resulted in smaller package sizes, which result in a greater package to product weight ratio, and a flood of individually

## TABLE 19

## NATIONAL PACKAGING MATERIAL CONSUMPTION TRENDS, 1958 to 1971

| Packaging Material | Paper | Glass | Steel | Plastic | Aluminum | Wood & Misc. |
|---|---|---|---|---|---|---|
| 1958 Consumption (1000 tons) | 16,552 | 5,933 | 6,198 | 368 | 97 | 6,212 |
| 1971 Consumption (1000 tons) | 27,700 | 11,100 | 7,255 | 2,900 | 757 | 10,613 |
| Consumption % change | 67.3 | 87.1 | 7.1 | 688.0 | 680.4 | 84.2 |
| % of Total 1971 Consumption of Material | 47.2 | 74.5 | 8.3 | 29.0 | 14.1 | ---- |
| 1958 Per Capita Consumption (pounds) | 193.0 | 69.2 | 72.3 | 4.3 | 1.1 | 72.4 |
| 1970 Per Capita Consumption (pounds) | 271.3 | 108.7 | 71.1 | 28.4 | 7.4 | 103.9 |
| Per Capita Consumption % Change | 40.6 | 57.1 | -1.7 | 793.0 | 572.0 | 43.5 |

Source: No Deposit No Return, A Report on Beverage Containers (87)

packaged items from single pieces of cheese to complete meals.

The target of post-consumer solid waste reduction should be excess packaging as defined earlier in this thesis. Many proponents of post-consumer waste reduction also argue for a consumer cost associated with packaging which reflects the true societal costs of the production and disposal of such packaging.

As perhaps a gross example, consider gift packaging of liquor. 40 percent of the liquor sold in the United States is sold during the holiday season.(91) Each year, bigger and better packaging innovations are introduced in this area. The result is increased consumer cost and increased generation of solid waste. There can be little doubt that over-packaging exists. Arguments result from discussions of the extent of over-packaging currently being purchased by the consumer.

As an example of a portion of the benefits which may be derived from packaging reductions, EPA has prepared a listing of the resource and energy impacts of a return to the per-capita packaging consumption of 1958 based upon the 1971 population of the United States. This data, presented in Table 20, should not be construed as an EPA recommendation but merely as an example of potential impact. In addition to the resource and energy savings shown in Table 20, the elimination of about 6 million tons of post-consumer solid waste would have saved $42,000,000 in disposal costs, based upon an assumed disposal cost of $7 per ton, and a portion of $120,000,000 in collection costs, based upon an assumed collection cost of $20 per ton.

TABLE 20

ENERGY AND MATERIAL SAVINGS WHICH WOULD HAVE OCCURRED IN 1971 FROM THE 1958 PER CAPITA PACKAGING CONSUMPTION LEVEL

| Packaging Materials | Actual 1971 Packaging Consumption (1000 tons) | 1971 Consumption At 1958 Level (1000 tons) | Material Savings (1000 tons) | Energy Savings (Trillion BTU's) |
|---|---|---|---|---|
| Paper | 27,700 | 21,137 | 6,563 | 267.8 |
| Glass | 4,900 | 6,465 | -1,565 | -23.9 |
| Steel | 5,235 | 6,819 | -1,584 | -46.8 |
| Aluminum | 212 | 124 | 88 | 17.3 |
| Plastic | 2,900 | 470 | 2,430 | 87.5 |
| Total | 40,947 | 35,015 | 5,932 | 322.5 |

Source: No Deposit No Return, A Report on Beverage Containers(87)

While savings of the magnitude indicated in Table 20 may be neither possible nor desirable, it seems certain that some post-consumer solid waste reduction can be accomplished in the area of non-beverage packaging by techniques and policies which will be discussed in a later section.

### 4.22 Beer and Soft Drink Containers

The recent high level of interest in a return to refillable beverage containers (beverage is used in this section in reference only to beer and soft drinks) probably results primarily from three causes:

(A) The high level of occurrence of non-returnable beverage containers in road-side litter, almost one-third of total items littered in a national survey.(92)

(B) Past reliance upon a system of largely refillable beverage containers.

(C) The implied favorable effects upon the environment and natural resource depletion.

The shift to non-returnable containers has been quite significant as shown in Table 21. It can be seen that over the period of 1955 to 1973 United States beverage consumption rose by 58 percent while the number of beverage containers used rose a staggering 488 percent. The tremendous increase in containers consumed resulted primarily from a shift to disposables, as we shall see.

TABLE 21

NATIONAL BEVERAGE CONTAINER CONSUMPTION TRENDS FOR THE YEARS 1955 AND 1973

| | 1955 | 1973 | Change (percent) |
|---|---|---|---|
| Beverage Fillings Consumed (billions of 12 oz. equivalents) | 55.5 | 87.6 | 58 |
| Containers Consumed (billions) | 10.6 | 62.4 | 488 |
| Average Fillings Per Container | 5.2 | 1.4 | --- |
| Per Capita Container Consumption | 64 | 297 | 364 |

Source: No Deposit No Return, A Report on Beverage Containers(93)

Also of interest is the relative mix of beverage containers and the share of the market demand satisfied with each type. This information is presented in Table 22 for the years 1955 and 1973. Table 22 shows a significant shift from refillable bottles and, to a lesser degree, cans to non-refillable bottles. It is also interesting to note the fact that returnable bottles made only half as many trips in 1973 as in 1955. Either bottles were being broken more frequently in 1973 than 1955 or there were more people who were willing to sacrifice the deposit for the convenience of disposing of the container. Using the data presented in Table 21, simple calculations indicate that the same function performed by the mix of 62.4 billion 12 ounce equivalent containers in 1973 could have been performed by 5.84 billion returnable containers.

In 1974, MRI completed an extremely detailed analysis of the nine most probable beverage container alternatives. Environmental impact, resource utilization and solid waste generation were evaluated for each alternative in a manner which attempted to insure consideration of total impact from container and delivery package manufacture and disposal to energy used to transport returned containers. The results of this study, as regards the five best alternatives, are presented in Table 23.

## TABLE 22

## MIX OF BEVERAGE CONTAINERS IN USE AND THE SHARE OF THE MARKET DEMAND SATISFIED BY EACH FOR THE YEARS 1955 AND 1973

| | Cans | Non-Refillable Bottles | Refillable Bottles |
|---|---|---|---|
| 1955 | | | |
| Fillings | | | |
| Number* | 7.6 | 1.4 | 46.5 |
| Percent of Total | 13.7 | 2.5 | 83.8 |
| Containers | | | |
| Number* | 7.6 | 1.4 | 1.6 |
| Percent of Total | 72.0 | 13.0 | 15.0 |
| Trips/Container | 1 | 1 | 29.1 |
| 1973 | | | |
| Fillings | | | |
| Number* | 40.1 | 20.5 | 27.0 |
| Percent of Total | 45.8 | 23.4 | 30.8 |
| Containers | | | |
| Number* | 40.1 | 20.5 | 1.8 |
| Percent of Total | 64.3 | 32.9 | 2.8 |
| Trips/Container | 1 | 1 | 15 |

*Billions of 12 oz. equivalents.

Source: No Deposit No Return, A Report on Beverage Containers (94)

## TABLE 23

## COMPARISON OF FIVE DIFFERENT CONTAINERS FOR DELIVERING 1,000 GALLONS OF BEVERAGE*

| Environmental Impact | 10 Trip Returnable Glass | All Steel | Bimetallic | One Way Glass | Aluminum |
|---|---|---|---|---|---|
| Energy (M BTU) | 24 | 41 | 57 | 72 | 91 |
| Virgin Raw Materials (lb.) | 1538 | 2029 | 1677 | 7515 | 578 |
| Water Volume (1000 gal.) | 11 | 38 | 34 | 37 | 16 |
| Waterborne Waste (lb.) | 45 | 349 | 335 | 68 | 249 |
| Atmospheric Emissions (lb.) | 111 | 157 | 234 | 328 | 381 |
| Post-Consumer Solid Waste (cu. ft.) | 12 | 4 | 3 | 41 | 3 |
| Industrial Solid Waste (lb.) | 8 | 71 | 61 | 32 | 29 |

*All containers are 12 ounce beer.

Source: Second Report to Congress on Resource Recovery and Source Reduction(95)

On the basis of least overall adverse impact, MRI selected the 10 trip returnable bottle as the best of the alternatives listed in Table 23.(96) It is interesting to note that the increased thickness required to facilitate reuse of the glass container results in an absolute container material volume contribution to the post-consumer solid waste stream greater than all alternatives other than the one-way glass container. The indication seems to be that a total shift to the reusable glass container would result in benefits in all categories except post-consumer solid waste reduction.

Due to the large portion of the beverage container mix which is made up of one-way glass containers, 32.9 percent (from Table 22), and the very large contribution to the post-consumer solid waste stream made by the one-way glass containers, 41 cubic feet per 1000 gallons of beverage delivered (from Table 23), a total shift to returnables would result in a positive impact in all areas of consideration shown in Table 23 including post-consumer solid waste generation. At the First National Conference on Packaging Wastes in 1971, Mr. Arsen J. Darnay of EPA estimated that exclusive use of returnable beer and soft drink containers in 1966 would have resulted in 1.3 million fewer tons of beverage containers in the post-consumer solid waste stream with an accompanying savings in disposal costs of $12 million.(97) No mention was made of estimated savings of collection costs.

## 4.3 Non-Durable Goods

Included in the category of non-durable goods are the many disposable non-packaging items which have become so commonplace in our society. In these days of relative affluence, such items as plates, cups, eating utensils, napkins, table cloths and diapers, to mention but a few examples, have become available as disposables. Table 24 shows the growth in per capita consumption of non-packaging paper, used primarily in the manufacture of non-durable goods, during the period of 1958 through 1970.

TABLE 24

PER CAPITA UNITED STATES NON-PACKAGING PAPER CONSUMPTION

| | 1958 | 1962 | 1966 | 1970 |
|---|---|---|---|---|
| Annual Per Capita Consumption (pounds) | 210.3 | 234.1 | 277.6 | 299.4 |

Source: The Role of Non-Packaging Paper in Solid Waste Management(98)

With the exception of the kinds of disposable items referred to in the previous paragraph, the likelihood of reducing the post-consumer solid waste stream by reducing the quantity of non-durables disposed of seems slim. Source separation and recycling of newspapers, books and office paper hold possibility but are subject to market conditions, discussed in a previous section of this thesis, and the public's desire to cooperate.

There may, however, be a possibility of holding the line against increased usage of throw-away items through some type of tax action which will, in effect, price disposables out of the market. Such public policy approaches will be discussed shortly. Examples of recently proposed disposable items include thermometers, bed pans, hospital gowns and sheets.(99) While action to reduce the use of such items holds potential, it seems advisable to obtain maximum return from actions directed at the more easily reduced categories of post-consumer solid waste prior to instituting programs to reduce more difficult categories, such as this one.

## 4.4 Durable Goods

The best possibility of reducing the quantity of durable goods in the post-consumer solid waste stream seems to lie in increasing the life of such goods. This can be done by either manufacturing longer lived products initially, by increasing the availability of repair for currently available products or by stimulating the return of unwanted durable goods to retailers for repair and resale or salvage. As indicated previously, source concentration of durable goods seems to result in salvage which, in turn, keeps them out of the post-consumer solid waste stream. Return to retailer or salvager could be stimulated by a deposit system.

Frequent model changes in durable goods are probably at least partially responsible for early obsolescence and high repair costs. Less frequent design changes and more easily repairable products are

likely to result only if there is a feeling on the part of the manufacturer that such actions are to his advantage. The stimuli which could result in such a feeling are unclear at best.

Of some encouragement is a prediction by MRI that demand for the longer lived radial and bias belted tires will increase until, in the year 1990, demand will be virtually non-existant for the shorter lived bias ply tire.(100) Such natural changes in consumer demand will result in reductions in durable goods discards.

Also of some value is a continuing, and recently more heavily emphasized, U. S. Army program of tire retreading. The Army currently retreads about 75 percent of tires replaced at a savings of 50 percent over new tire cost.(101) Retreading is not a new development by any means; but, by successfully conducting such a program, the Army gives hope for a renewed effort of major proportions along these lines.

### 4.5 Food and Yard Wastes

The possibility of reducing the quantity of food wastes in the post-consumer solid waste stream through the use of garbage grinders has been evaluated by the American Public Works Association (APWA). In reality, this represents merely a change in form; but, under certain circumstances, it may be a beneficial method of reducing the post-consumer solid waste stream.

APWA estimates that total water use would increase only 2 to 3 percent overall, but that raw sewage suspended solids would rise by 50 percent, biochemical oxygen demand by 30 percent and grit by 40

percent.(102) If the municipal sewage treatment plant is near capacity prior to widespread use of garbage grinders, overload could occur. On the other hand, if the plant is not near capacity, no real problems should result and, in the case of plants which use sludge gas in heat generation, operation costs may actually decrease.(103)

The condition of the sewage collection system also must be considered. If deposition problems have existed prior to widespread use of garbage grinders, they will undoubtedly increase. More frequent sewer flushings may be required. The above factors must be given serious consideration prior to instituting a large scale program of garbage grinders in homes and businesses. Under specific circumstances such programs may offer viable means of reducing the quantity of food waste in the post-consumer solid waste stream.

The collection and disposal of yard wastes could be reduced in selected sections of the country through public education. If lawn mowings are accomplished on a planned schedule, the clippings need not be collected and will, in fact, be beneficial to lawn growth for certain types of grasses if left on the ground. The same is frequently true of leaves if they are shredded sufficiently during mowing.

## 5.0 MECHANISMS TO ACHIEVE POST-CONSUMER SOLID WASTE REDUCTION

### 5.1 Technical Options

In its First Report to Congress on Resource Recovery and Source Reduction delivered in early 1973, EPA's OSWMP had begun to formulate a plan which was intended to result in reduced post-consumer solid waste generation. In this report, OSWMP stated that efforts which result in more use or service from a given quantity of materials or the substitution of products with lower material requirements for those with high material requirements can reasonably be expected to result in post-consumer solid waste reduction.(104)

In a later publication, EPA indicated that efforts would be concentrated upon activities which relate to the following:(105)

(A) Product reuse--The development and use of products which can be reused.

(B) Reduced resource intensivity--The development and use of products that require less material and energy to manufacture.

(C) Increased product lifetime--The development and use of products with extended useful lifetimes.

(D) Decreased product consumption--The direct reduction of product consumption.

In its as yet unpublished Third Report to Congress on Resource Recovery and Waste Reduction, EPA puts very heavy emphasis on the first three of the above four approaches for reducing post-consumer solid waste generation.(106) The remainder of this section shall be devoted

to a discussion of the above technical options for post-consumer solid waste reduction and the public policy approaches which may reasonably be expected to stimulate emphasis thereupon.

### 5.11 Product Reuse

Product reuse is applicable to the general and growing category of products, both packaging and non-durables, which are designed for a single use but which could be designed for multiple uses in serving the same function. There are two general cases where product reuse could occur. The first is when the use and reuse of the product is internal to an organization such as a moving company reusing corrugated shipping containers or the new mother using cloth instead of disposable diapers. The second case involves handling by different individuals to facilitate reuse such as must occur in a refillable beverage container system. The problems involved in developing the two types of reuse mentioned above are very different, the latter requiring considerable adjustment by commerce, the former, less.

The methods by which organizations, whether commercial concerns or individual households, can be stimulated to move toward reuse are essentially three in number.

(A) The non-availability of the disposable item (ban).

(B) A policy which results in an increase in the cost of disposability or a reduction in the cost of reuse or both (taxes, deposits, or charges).

(C) An educational program which results in reuse through voluntary actions.

A more detailed discussion of the above public policy techniques will be contained later in this section.

Neglecting the non-economic issues previously discussed as justification for post-consumer solid waste reduction as not being universally held, and assuming that non-reusable options continue to be available, a primary motivation for reuse of any product must undoubtedly be reduced cost. As long as it is felt to be less expensive for the moving company to dispose of shipping containers instead of reusing them, reuse is not likely to be practiced. If the young mother continues to value the convenience attained through disposable diaper use over the extra cost, no change in behavior is to be expected.

As discussed earlier, there is strong evidence that a low mandatory deposit on beverage containers is adequate to result in a strong shift to returnable beverage containers. Presumably, the cost of convenience to the consumer is increased to a point at which most desire the economic benefit of the refunded deposit; and the cost of utilizing disposable containers, which must be accepted for return by the entire commercial system providing such beverages, becomes greater than the cost of reusable containers.

An excellent example of successful stimulation of intra-organizational reuse, in this case the household, has recently been reported upon by EPA.(107) Red Owl Stores, Inc., a supermarket chain in Minnesota, North Dakota, South Dakota, Wisconsin, Iowa and Michigan, has established a program designed to stimulate the reuse of paper shopping bags, egg cartons and milk containers. The chain also sells a plastic shopping bag which can be reused at least 25 times. The

program consists of three major parts:

(A) Cash refunds--The consumer receives 2 cents for each paper shopping bag refilled. A 3 cent refund is allowed for each egg carton repacked from a bulk egg display.

(B) Promotion of refillable milk containers--Advertising stresses consumer savings if refillable containers are used. A 4 cent refund is allowed for each such container, both glass and plastic, returned.

(C) Provision of plastic shopping bags--A plastic reusable shopping bag is sold for 25 cents. The consumer is asked to use and reuse this bag instead of single-use paper bags. A 2 cent refund is allowed each time the plastic bag is used.

Consumer acceptance of the above program has been very encouraging and EPA reports that the program has not resulted in increased operating cost to the supermarket chain. Annual post-consumer solid waste reduction is estimated to be 33 tons for this specific, small scale program. Such a program as the above requires no major innovation, manufacturing change or support structure development. It is within the immediate capability of most supermarkets.

### 5.12 Reduced Resource Intensivity

This approach will result in a decrease in the amount of materials used in the construction of a product and is, therefore, likely to result in decreased post-consumer solid waste generation. Since it is also a major means of cutting industry costs, and hence wholesaler, retailer and consumer costs, it is often accomplished by

the working of normal market forces.

Since there exists evidence that the free market system may not really provide exactly what the consumer desires when he desires it, if at all, it must be assumed that policies which are intended to result in post-consumer solid waste reduction through reduced resource intensivity must stimulate the producers of consumer products to appropriate action as well as the consumer himself. Such policies might include:

(A) Economic stimuli to reduce resource intensivity (taxes).

(B) Standards relating to allowable levels of resource intensivity (design regulations or performance standards).

(C) Educational programs which result in reduced resource intensivity through voluntary actions by manufacturers or consumer pressures.

As mentioned previously, reduced cost is probably the greatest motivation for reduced resource intensivity. As an example, the International Paper Company has recently redesigned their half-pint milk container, and, as a result, predicts that over 10 million dollars can be saved annually by the dairy industry.(105) The new half-pint container is 2 1/4 inches square instead of the usual 2 3/4 and manufactured of a lighter-weight but stronger paperboard fiber. These changes together result in a 31 percent reduction in paper use and a 16 percent reduction in low-density polyethelene plastic coating. If all half-pint milk containers in the nation were converted to the newly designed package, annual material savings, and post-consumer solid waste generation reductions, of 59,000 tons of paper and 4,000

tons of plastic would result.(105)

Increased packaging size also shows potential for reduced resource intensivity as reported by EPA.(108) EPA states, for example, that the 7 ounce returnable glass container requires about twice as much glass per ounce of beverage delivered as the 32 ounce size. Similarly, the 8Z tall can contains about one-half the volume of the number 303 can and requires 25 percent more steel per ounce of product delivered. In virtually all cases, says EPA, consumers who buy their products in larger containers save packaging materials.

It has recently been reported that glass bottles currently utilize only about one percent of the theoretical tensile strength of glass.(109) If this can be increased to only 5 percent, glass containers can be constructed with much less glass and the amount of protection required in the corrugated shipping container reduced. This could result in significant reductions of such materials in the post-consumer solid waste stream.

The above are but a few examples of actions taken or those which could be taken to effect reduction of the post-consumer solid waste stream through reduced resource intensivity.

### 5.13 Increased Product Lifetime

Product lifetime is the length of time household consumer goods remain in use from purchase through final discard. Clearly, the useful product lifetime impacts upon the post-consumer solid waste stream. As product life increases, per capita post-consumer solid waste generation per unit of time for the product decreases.

Unfortunately, product lifetime depends not only upon durability of the product but also upon such things as stylistic obsolescence, cost of replacement goods, ease of repair and, perhaps, cost of disposal. While product lifetime can be thought of in reference to non-durable goods, this discussion will be directed specifically at such items as household appliances, furniture, tires and other consumer durable goods.

To some extent, increased product lifetime is currently available in the marketplace. The consumer may, at higher initial cost, purchase tires guaranteed to perform satisfactorily for longer than the average period of time. The same choice exists in the case of some major appliances. Unfortunately, the average consumer either does not have the facts required to calculate the actual costs of the various alternatives or the increased initial cost makes purchase of the longer lived item appear undesirable.

Attempts to influence increased product lifetime must also address the high cost or lack of availability of repair and service facilities for consumer durables. Most heads of households have probably been informed, in the case of a television or other household appliance or furnishing, that repair is possible; but that the cost, even for what may seem to be minor repairs, will be prohibitive. "Throw it away and buy a new one" seems to be a common piece of advice.

The types of policies which might be expected to result in increased product lifetime are as follows:

(A) Encouragement of return of durable goods to manufacturers for salvage or repair (deposits).

(B) Standards relating to required product life and repairability (design regulations or performance standards).

(C) Consumer education as to the true costs of products with guaranteed longer life as compared to the costs of shorter lived products with lower initial costs.

With the exception of the automobile tire example previously discussed, no detailed studies of the effect of increased product lifetime upon the post-consumer solid waste stream were located in research for this thesis. It appears that, while considered a potential method of post-consumer solid waste reduction, increased product lifetime is expected to be of lesser overall benefit than the other, previously mentioned technical options. Policy options which could reasonably be expected to result in increased product lifetime will, nonetheless, be discussed in more detail later in this section.

### 5.14 Decreased Product Consumption

Some thought concerning the types of public policies which would be required to result in decreased consumer consumption, and the probable reactions by business, commerce and consumers to such policies, tends to clarify EPA's probable reasons for reduced emphasis upon this technical option. While it may be true that public policy actions which relate to the previously discussed technical options may result in slightly decreased consumer consumption as well, the goals of such actions would not be to specifically do so.

In reality, each of the technical options previously discussed is intended to result in reduced consumption of the things which enter

the post-consumer solid waste stream with the resultant reduction of the waste stream. If packaging is considered to be a product, decreased consumption of this specific product is obviously intended to result. Increased durable product lifetime is desired because it will reduce the post-consumer solid waste stream by resulting in decreased per capita consumption of durable goods per unit of time.

Unquestionably, there exist public policy options which could result in decreased product consumption. High taxes on selected items or rationing could be used to this end. However, in other than emergency situations the nature of the American free market system would undoubtedly result in very strong opposition to any such efforts based principally upon a goal of reducing product consumption. The total political costs of such an option are undoubtedly too great to allow reasonable expectation of successful implementation. For these reasons, this technical option shall be discarded as not viable without justification as one of the other technical options previously discussed.

## 5.2 Public Policy Approaches

The various public policy options which may be exercised as measures to reduce post-consumer solid waste will be discussed in the remainder of this section. Several policies, such as required minimum deposits and varying levels of taxes on packaging, have been studied in great detail and, in isolated instances, implemented. Others, such as bans and minimum performance standards, have not. Accurate predictions

of total consequences of the various public policy options, the levels of government at which specific policies should be instituted and the methods of implementation are subjects for some debate. Indeed, opinion is divided as to whether any action should be taken to reduce post-consumer solid waste at all. The evidence presented earlier indicates that, under most circumstances, certain actions which reduce post-consumer solid waste generation may result in benefits which outweigh costs.

No attempt will be made in this section to recommend a specific policy option for any certain situation. The intent is to identify the major public policy options available and to highlight the desirable and undesirable aspects of each. The specific circumstances existent in the region considering public policy measures to reduce post-consumer solid wastes will dictate which measures can be most successful as relates to attainment of objectives at acceptable cost and general public acceptance. Obviously, generalizations are without sound basis as such regional circumstances can vary widely. Later, the suggested roles of the various levels of government, and the bases for involvement of each in efforts to reduce the generation of post-consumer solid waste, will be addressed.

### 5.21 Educational Programs to Stimulate Voluntary Action

Probably the single most desirable public policy option available as a means of stimulating post-consumer solid waste reduction is an educational program which will stimulate voluntary actions resulting in an overall reduction in post-consumer solid waste generation.

Such a policy is, of course, based upon the premise that if producers, consumers and the various levels of government can be made aware of the benefits to be gained and adverse impacts to be avoided by post-consumer solid waste reduction, actions will be taken voluntarily.

OSWMP currently is distributing information bulletins called "Source Reduction Fact Sheets". Each fact sheet details some successful post-consumer solid waste source reduction program, such as the Red Owl Store program or the newly designed half-pint milk container mentioned previously, and requests reports of other such efforts for subsequent fact sheets. These fact sheets appear to be aimed primarily at business and commerce.

In addition, the many EPA publications are provided to other governmental agencies in an effort to apprise federal, state and local governments of new innovations in post-consumer solid waste reduction. The actual impacts and results of programs implemented at all governmental levels are also made known by EPA to appropriate parties.

Such educational programs as the above are commendable and are worthy of continuation and expansion. Efforts should be made to increase the level of general public awareness as relates to the many benefits to be gained from post-consumer solid waste reduction and how buying habits can be beneficially altered. The benefits of purchase of longer lived products could be made clear. Programs intended to inform the consumer of the true costs of overuse of disposable products could be implemented. The public could be informed of the many benefits, including reduced cost per unit of product, to be gained from purchase of items in larger containers with resultant reduced packaging to

product ratio.

A study completed by EPA in 1974 presented data on the average amount which is paid only for packaging out of each consumer dollar spent for various items.(110) For example, more than 20 cents of every dollar spent for soaps and detergents pays not for product but package. Other packaging costs per dollar expended upon specific products are as follows: beer--over 18 cents per dollar, soft drinks--over 38 cents per dollar, canned foods--over 25 cents per dollar, beauty aids--over 29 cents per dollar. The average of such costs for all consumer products is 3.86 cents per dollar. The above figures do not necessarily prove over-packaging in the case of products with the higher costs of packaging per dollar expended, but they do at least suggest a place to start looking. Consumers themselves might begin to demand reduced packaging if they were aware of what current packaging directly costs them.

Most manufacturers and commercial concerns are quite willing to take actions designed to reduce post-consumer solid waste, particularly if such actions result in reduced costs to them and therefore in more favorable market conditions. Unfortunately, practices which result in such benefits are usually considered to be business secrets and are not freely shared with competitors. EPA's source reduction fact sheets are a start in the reversal of such feelings. Other programs are required to continue to stimulate such knowledge sharing for the good of all.

The exact types of educational programs which are required are difficult to suggest, but, clearly, increased emphasis on the use of

such programs has potential for increased public and private involvement in post-consumer solid waste reduction. History has taught us that public policy makers are most interested in policy making which responds to the desires of constituants. As more constituants become convinced that post-consumer solid waste reduction is a beneficial and desirable goal, such policy will be easier to extract from the various beaurocracies.

### 5.22 Post-Consumer Solid Waste Collection and Disposal System User Charges

If one impression was consistently gained during the interviews of local government officials which were conducted as research for this thesis, it was a feeling that the average citizen could best be motivated toward post-consumer solid waste reduction by showing him that successful efforts on his part could save him money directly.(20, 111, 112) It would seem that this could best be accomplished by insuring that post-consumer solid waste collection and disposal user charges are assessed on the basis of actual quantities of solid waste generated.

The International City Management Association reported, in 1975, that less than half of the 600 cities responding to a survey conducted by the association generated post-consumer solid waste collection and disposal funds through a service charge to citizens.(113) Also reported was the fact that service charges, when assessed, are generally not sufficient to cover actual costs. Service charges are only infrequently determined on the basis of actual degree of usage.

A program which results in service charges to citizens which reflect actual levels of usage is within the means of most cities. For example, the use of municipally sold plastic bags, the purchase price of which includes the cost of solid waste collection and disposal, has been proven feasible in many cities across the country. Certainly, in such cities, consumers are aware of the cost of solid waste collection and disposal and, presumably, are interested in reducing their direct costs.

Arguments against the application of usage based charges instead of flat fees or general fund financing center upon claims that some consumers simply can not afford to pay for the level of service actually provided. To some degree, such arguments are valid. Predictions of increased promiscuous dumping are also used as arguments. These arguments also may be well based.

It seems that one very basic method of increasing consumer awareness of the actual costs of post-consumer solid waste collection and disposal is to show him what his actual costs are. As discussed above, there are shortcomings; but in most cases, payment for services rendered seems both justifiable and beneficial to post-consumer solid waste reduction programs.

### 5.23 Taxes

5.231 Use Tax. Taxation of various portions of the post-consumer solid waste stream has been suggested as a means of internalizing total societal costs such as litter and other post-consumer solid waste collection, disposal and environmental costs.(114) Such a tax is usually

referred to as a use tax. The obvious logic suggested by the above is that levels of taxation should vary to reflect the level of societal cost expected to result. Major problems surface in attempting to determine a basis for rates of such taxation which will allow ease of collection, administration and eventual distribution of revenues for the designated end use.

The ability of a use tax to raise revenue for post-consumer solid waste related expenses is certain. The existence of a requirement for such funds is even more certain. The potential of such a tax for reducing post-consumer solid wastes depends to a great degree upon the basis for the tax rate.

The use tax is potentially less discriminatory than the deterrent tax, to be discussed shortly, and is less likely to disturb free market selection of products or materials. A use tax which is assessed at the producer level could spur product reuse by providing the economic incentive of reduced cost. For example, the use tax would be assessed once per beverage container regardless of whether the container was reused or not. Presuming that the tax is passed on to the consumer, each consumer purchase of a beverage in a disposable container would include the full tax while each purchase of a beverage in a refillable container would include only a portion of the tax, the amount depending upon the number of reuses expected.

Drawbacks related to the use tax include a requirement for potentially elaborate machinery for administration. This also will depend, to some extent, on the basis for the tax rate as well as the product taxed and the location at which the tax is assessed (i.e. producer,

wholesaler, retailer). If the tax revenue is to be utilized to combat litter, the consumer who does not litter will be paying unduely. Similarly, if post-consumer solid waste disposal funds are to be generated, some consumers may end up paying for disposal twice--upon product purchase and upon product disposal. Less likely, but a possibility, is the fact that such a tax may be regarded as a license to litter or pollute. Manufacturers have begun to show some regard for the disposability and subsequent environmental effects of products during product design. There is the potential that a tax assessed to include such external costs in product sale price may result in less concern by manufacturers for such problems.

5.232 Deterrent Tax. A tax that is primarily intended to influence consumer or producer actions in the negative sense is called a deterrent tax. For example, a tax which is intended to reduce the use of a material that is in short supply or that is particularly hard to dispose of is such a tax. This type of tax is, in reality, an indirect form of regulation and obviously constitutes market control to some degree. A tax on "excess" packaging could be considered to be a deterrent tax.

Deterrent taxes are, by design, very discriminatory and difficult to justify. The level of the tax required to "price the product out of the marketplace" may be considerably in excess of the true societal cost of product use. Objective judgments must be made as relates to the level of disposal difficulty which is required, the degree of supply shortage which must exist or the level of packaging excessive enough to justify deterrent taxation.

Deterrent taxes are potentially very complicated to administer. For example, a packaging tax recently proposed by New York City's Environmental Protection Administration consists of the following:(115)

(A) A 1.3 cent per unit tax on glass bottles.

(B) A 2.0 cent per unit tax on plastic bottles.

(C) A .5 cent per unit tax on steel cans.

(D) A .25 cent per unit tax on aluminum cans.

(E) A 2.3 cent per pound tax on paper packaging.

(F) A 3.8 cent per pound tax on plastic packaging.

Collection of the above tax at the wholesale level is suggested, but it seems clear that administration of the above tax would be quite complicated. No justification of the rates of taxation for the various products was given.

5.233 <u>Tax Assessment Base</u>. Many bases have been suggested for assessment of both use and deterrent taxes on consumer products. Most frequently, a per unit tax and a tax per unit of weight have been recommended. Also receiving consideration are taxes based upon product sales price and product lifetime. Each of these potential tax bases will be discussed briefly.

The per unit tax would be assessed on each unit of product, such as beverage containers, rigid packaging, or major appliances, manufactured or consumed. As discussed earlier, such a tax could stimulate the manufacture and utilization of reusable products, particularly in the case of beverage containers and packaging. Such a tax could also stimulate a shift to larger packages with consequent post-consumer

solid waste reductions. A uniform tax per unit would be neutral as relates to material selection and would, therefore, not interfere greatly with the free market system in this sense. An argument against a uniform tax per unit can be made on the basis of equity. For example, such a tax would result in the same assessment upon the small laundry detergent package and the large carton used to protect the washing machine during delivery. The per unit tax relates particularly well to costs of litter collection.

A tax based upon product weight more directly relates to actual post-consumer solid waste collection and disposal costs. There is some conflict between the weight based tax and the disposability of products and product reuse. For example, the difficult to dispose of, but lighter, plastic container would be less heavily taxed than the more easily disposed of, but heavier, reusable glass container. The heavier, perhaps more durable, product is more heavily taxed than the lighter, shorter lived item.

A recent EPA study evaluated the potential of national consumer packaging taxes on both a per unit and per weight basis. Tables 25 and 26 summarize the results of that study. Unfortunately, the study did not consider the administrative costs and distribution of revenues collected. Tables 25 and 26 indicate greater gross benefit and lower cost per unit of effectiveness in the case of the per unit tax. EPA also stated that they expected the per unit tax to be more easily administered.(116)

## TABLE 25

## SUMMARY OF THE EFFECTIVENESS AND COSTS OF NATIONAL FISCAL POLICY INSTRUMENTS FOR CONTROL OF CONSUMER PRODUCT PACKAGING

| | Weight Based Tax Rate ($ Per Ton of Packaging) | | | | Per Unit Tax Rate (Cents Per Container) | | | |
|---|---|---|---|---|---|---|---|---|
| Effectiveness | 10 | 22 | 50 | 100 | .5 | 1.0 | 1.5 | 2.0 |
| Post-Consumer Solid Waste Reduction (1000 tons) | 201 | 441 | 988 | 1,930 | 1,549 | 2,317 | 2,766 | 3,183 |
| Reductions in Raw Material Consumption (1000 tons) | 273 | 597 | 1,348 | 2,627 | 1,950 | 3,019 | 3,719 | 4,413 |
| Reductions in Energy Utilization (million KWH equivalent) | 529 | 1,157 | 2,596 | 5,078 | 3,897 | 5,956 | 7,287 | 8,530 |
| Loss in Consumer Surplus* (millions of dollars) | .4 | 1.9 | 9.7 | 36.5 | 10.7 | 41.7 | 93.8 | 166.5 |
| Tax Payments (millions of dollars) | 273 | 597 | 1,337 | 2,582 | 1,651 | 3,138 | 4,622 | 6,073 |

*"Losses in consumer surplus" are defined as the maximum amount of money that consumers would offer in order not to have an increase in consumer product prices. These figures were developed from estimates of the price impact and elasticity of demand for the packaged products.

Source: *Third Report to Congress on Resource Recovery and Waste Reduction*(117)

TABLE 26

SUMMARY OF THE COSTS PER UNIT OF EFFECTIVENESS OF NATIONAL FISCAL POLICY INSTRUMENTS FOR CONTROL OF CONSUMER PRODUCT PACKAGING

| Measure of Effectiveness | Weight Based Tax | Per Unit Tax |
|---|---|---|
| Dollars Per Ton of Solid Waste Reduced | 2-19 | 7-52 |
| Dollars Per Ton of Reduced Raw Material Use | 1-14 | 5-38 |
| Dollars Per 1000 KWH of Reduced Energy Use | 1-7 | 3-20 |

Source: Third Report to Congress on Resource Recovery and Waste Reduction(118)

In 1971, voters in the State of Washington adopted a litter control law which levies a tax of $150 per $1 million dollar sales volume on manufacturers, wholesalers or retailers of products related to litter problems. These include food products, groceries, tobacco products, soft drinks, newspapers, paper products, toiletries, non-drug sundries sold in drugstores and glass, metal and plastic containers. The intent of the tax is to provide funds for litter control.(3) The uniformity of such a tax probably makes administration relatively easy; but, at such a low level, the tax undoubtedly results in little more than provision of funds for litter control. Problems in equity can also be seen to exist in the tax which impacts equally on both the

litterer and the non-litterer.

A tax based upon product life could conceivable stimulate the manufacture and sale of longer lived durable items by increasing the initial cost of shorter lived products relative to their longer lived counterparts. No evidence of the use of such a tax was found.

### 5.24 Deposits

Not many years ago, deposits were used extensively by beverage companies to motivate the consumer to return refillable beverage containers to retail outlets for eventual reuse. In 1972, Oregon became the first state to require minimum deposits on all beer and carbonated soft drink containers through legislation. The focus was upon reduction of the litter problem which had become an issue of great concern to the citizens of Oregon. Since then, several additional states, Vermont and South Dakota, have implemented such legislation and nearly all other states have had similar bills introduced.(119) The Oregon and Vermont laws are included in Appendices C and D as examples of such legislation.

Additionally, a recent survey of 1,115 cities conducted by the International City Management Association showed that 15 had enacted similar legislation by 1974, primarily city suburbs with populations below 100,000.(120) As recently as October, 1975, the City of Berkeley, California, passed legislation requiring minimum deposits on beer and soft drink containers.(121) Thus, interest in the use of deposit systems as a means of reducing the post-consumer solid waste impact of beverage containers has continued.

The relatively high level of interest in deposit systems, particularly as relates to beer and soft drink containers, can be attributed to a number of factors. Such a system has the benefit of successful performance in the past. In the case of some products such as beverage containers, all necessary commercial machinery has existed in the past and, to some extent, remains. Deposit systems do not restrict consumers and producers from taking any action they deem desirable. Government intervention is minimized. Additional costs are borne only by those consumers who do not return products for deposit refund, hence, relative equity results as compared to some other public policy options. As shown to be the case in Oregon, litter is reduced. Additionally, data gathered in Oregon since the implementation of that state's law indicates that minimum deposit legislation results in a shift to reusable containers with attendant societal benefits. (Pre-law returnable container use was 36 percent for beer and 53 percent for soft drinks, post-law use was 96 percent and 91 percent respectively.(122)

A major problem to be addressed in the consideration of deposit systems for post-consumer solid waste reduction is the support system required. The system required for the handling and reutilization of products returned requires some time to be fully developed. Most legislation requiring minimum deposits has considered this factor and provided a period of adjustment prior to law implementation.

In the specific case of beverage container minimum deposit legislation, several detailed studies are recommended for increased insight. EPA has published a study, <u>The Beverage Container Problem</u>,

Analysis and Recommendations, which evaluates a nationwide minimum deposit policy. The State of New York's report, No Deposit No Return, A Report on Beverage Containers, investigates the implications of such a policy in the State of New York. A copy of pertinent legislative considerations from this report is included for information as Appendix E. Finally, an excellent evaluation of the actual consequences of the Oregon law, Oregon's Bottle Bill--Two Years Later, is available from the Oregon Environmental Council.

Deposit systems show potential for reducing portions of the post-consumer solid waste stream other than beverage containers. Deposits could be utilized as a mechanism for source concentration to stimulate salvage and recycle, thus keeping items from entering the post-consumer solid waste stream. Source concentration, which occurs naturally in the case of small quantities of tires and major appliances, seems to have resulted in salvage markets for such items in the past. There seems to be potential for post-consumer solid waste reduction as well as increased resource recovery through the use of product disposal deposit systems, particularly in the case of major appliances, items of furniture and tires.

Briefly, such a system could function in this manner. The producer could be required to pay a deposit on each item manufactured into a special public fund. Presumably, the amount of the deposit would be added to the consumer cost of the item. This deposit would be refunded upon eventual delivery of the product to an approved location for salvage or reclamation. It is felt that the source concentration which would result would remove a significant cost obstacle to resource

recovery and perhaps result in salvage and reuse of parts or whole products. This, in turn, would result in a reduction in the flow of such items into the post-consumer solid waste stream.

Deposit systems, without doubt, show potential for post-consumer solid waste reduction and realization of many of the associated benefits.

### 5.25 Bans

A study conducted in 1972 indicated that about half of the federal, state and local beverage control laws under consideration at the time proposed bans on some type of container, container use, specific material, or method of opening.(123) Section 1525 of Appendix C, the Vermont Minimum Deposit Amendment, is an example of such a provision. The use of bans seems to be another commonly proposed public policy option.

In general, overwhelming evidence of a positive impact upon the public health and welfare is required to sustain a ban. The tremendous amount of turmoil caused by the federal ban on DDT indicates this. Bans constitute direct government intervention in the marketplace and result in immediate obsolescence of processes and equipment with subsequent severe economic impacts in some areas. Heavy reliance upon legal restraint and enforcement can result in relatively significant administration costs. As the efforts concerning the phosphate content of detergents demonstrated, banning a product can cause serious employment dislocations, lawsuits and consumer black markets.

One source states that product bans are legal under the police power of the city if it can be shown that the ban will attain a legitimate social objective.(124) None the less, bans will probably be attacked as a burden on interstate commerce and, if so found, will be held to be unconstitutional. At any rate, bans are probably not practical local government solutions to post-consumer solid waste management problems. Other public policy measures which can yield similar results are probably available and will be much less offensive to the consumer and producer. For example, it has been shown that minimum deposit legislation has much the same result as a ban on non-returnable containers without the social stigma.

Under very special circumstances, such as a serious threat to public health, bans on products may be necessary but should be addressed at the highest level of government, federal, if possible.

### 5.26 Design Regulations and Performance Standards

This public policy option implies a regulatory authority which establishes specifications in advance of manufacture that particular products or product classes must meet. These could be aimed at increasing durability, repairability or reuse; or the goal could be reduced resource intensivity or disposal problems. Maximum packaging to product weight ratios could be specified. Easy removal of the shorter lived portions of products, for example washing machine motors, could be required to make repair less difficult or expensive and therefore prolong product life. Requirements to insure that gases harmful to equipment are not generated during incineration of products likely

to be so disposed of could be specified. In the extreme case, minimum acceptable product lifetime guarantees could be required for major durable items.

Such public policies as the above are undoubtedly not likely in the near future due to the degree of direct government intervention required in decision areas which have historically belonged solely to the producer. The potential for reduction of post-consumer solid waste, not to mention other societal benefits, however, is great and such approaches may, in the future, come under serious consideration.

## 5.3 Guidelines for Policy Selection

In the selection of a public policy for post-consumer solid waste reduction, several major factors should be considered. First, the impacts of the policy should be predictable. Predictability is premised upon sufficient pre-policy study and planning. The need for thorough evaluation of the probable impacts of any policy choice can not be overemphasized. At least the major impacts external to the jurisdiction should be assessed as well as all internal impacts suspected to be of significance.

The policy option selected should be expected to have benefits which exceed costs, including the expenses of policy administration. Whether such costs and benefits should include only those internal to the region in question can be decided only by the appropriate policy makers; however, it is strongly recommended that consideration be given to the change in the benefit to cost ratio occurring if external impacts

are added. The key is to insure that all major impacts of the action, both internal and external, are given due consideration. If some major external cost or benefit may result, the policy maker must be so apprised.

To the extent possible, the policy action should result in an equitable distribution of costs and benefits. For example, minimum deposit mechanisms are considered to be relatively equitable since only the consumer who is disposed to litter or discard, albeit properly, reusable containers pays a higher price for this privilege. True equity, if such can be defined, will undoubtedly never be achieved. Consideration of the question of equity is important, however, in order to judge relative degrees.

Ease of administration is an extremely important consideration. If any existing market-type mechanism can be utilized, administrative costs can probably be reduced considerably. For example, a tax on beer and soft drink containers would be much more easily administered in a region which already assesses an excise tax on such beverages. If taxes or charges are to be levied, consideration should be given to the level at which such taxes or charges can be most efficiently collected. For example, taxes on packaging material would undoubtedly be more easily collected at the manufacturer than at the retail outlet for packaged products.

Serious consideration should be given to the appropriate level of government for policy implementation. Many types of beverage container legislation are already in force and even more under consideration. Standardization usually results in ease of administration. It

would undoubtedly prove to be of greater overall benefit for a number of cities in a county to successfully work toward county legislation instead of for each to draft and implement independent legislation. Care must also be taken to evaluate the potential for the effects of a local policy action to result in reduced local competativeness for business and consumer spending, another situation which can be avoided to some degree by standardized public policies.

The above discussion by no means exhausts the potential listing of considerations as relates to public policy decisions intended to reduce post-consumer solid waste, but is does address the major ones. Local conditions will dictate the other major considerations required.

# 6.0 SUGGESTED ROLES OF THE FEDERAL, STATE AND LOCAL GOVERNMENTS

In attempting to suggest the roles of the above principal actors in post-consumer solid waste source reduction efforts, a number of constraints must be considered. While none of the previously discussed public policies to reduce post-consumer solid waste are beyond the legislative capability of the federal government, tradition and current political climate limit the practical possibilities. Such limitations are at least as important as statutory constraints, and have been considered in attempting to suggest the various roles to be played.

State constitutions vary widely. Actions which are consistent with the United States Constitution can be found to be consistent with one state constitution and in violation of another. The progressive income tax is an excellent example. This tax has been in use for some time in the State of Ohio, while, next door in Pennsylvania, the progressive income tax has been found to be in violation of the state constitution. The above is but one example of the differing conditions imposed by different state constitutions but points out the potential hazards inherent in assuming broad applicability of specific policies successful in certain states. The possibility of constitutional amendment to allow policy implementation always exists, but a requirement for such action will considerably complicate the process.

Also a consideration is the fact that all local government authority exists by virtue of the authority of the appropriate state government, and that the various state governments have not seen fit

to delegate such authority to local governments equally from state to state or even within the same state. (Local government shall refer to both city and county governments in this paper.) For example, the State of Pennsylvania severely restricts the authority of county government and grants varying levels of authority to Pennsylvania city governments depending upon the class designation assigned.(125) For this reason, no generalizations can be made as regards the legislative capability of any local government. State enabling legislation may or may not be required for a local government to be able to institute a specific public policy intended to result in post-consumer solid waste reduction.

## 6.1 The Federal Government

In attempting to ascertain the role of the federal government in post-consumer solid waste reduction, it is interesting to first examine this role as seen by various individuals and groups. In a publication of 1970, Mr. Donald D. Kummerfield of the Research Services Division of the Center for Political Research in Washington, D. C. said:

> While the increasing cost of community solid waste management is recognized by the White House and Congress, federal policy is clearly beginning to deal with a more fundamental issue: the private sector's largely unregulated freedom to manufacture and package its products without any accompanying responsibility for 1) the quantity and impact of the ensuing solid waste and 2) the increasing depletion of natural resources.(4)

The above quote seems to indicate that federal interest should be based upon economic, environmental and natural resource conservation

considerations.

At the First National Conference on Packaging Wastes, conducted in 1971, Mr. Irving K. Fox, a representative of the packaging industry, saw one role of the federal government to be the inducement of those who produce materials which will eventually become wastes to alter the kinds and quantity of material used so as to minimize the cost or damages associated with waste disposal.(126) Again, the economic and environmental issues are suggested as principle federal interests.

In a recent publication, the League of Women Voters (LWV) spelled out, in some detail, its suggested federal government role.(127) The federal government, said the LWV, should insure uniform national policy, perform an educational function, conduct studies and attempt to influence voluntary industry actions in the post-consumer solid waste reduction area.

The concensus statement resulting from an American Public Works Association sponsored seminar on Solid Waste Management in 1975 called for federal concentration on methods of resource and energy conservation.(128) The reduction of solid waste generated was specifically addressed as an area for increased federal study and investigation as a technique for conserving energy and reducing local government costs.

In a report published in 1973, the National Association of Counties called for the federal government to take the lead in waste reduction efforts since only it could control manufacturers, packaging practices and other causes of waste generation. In addition, it was suggested that industries be given preferential tax treatment for research and development costs associated with reduced waste

generation.(129) In response to an EPA questionnaire distributed in 1974, several states indicated that the federal government could best serve in the waste reduction area by acting as a technical assistant and information reservoir.(130)

EPA itself sees the federal government roll in post-consumer solid waste reduction as consisting of 1) the development and implementation of educational programs intended to result in voluntary actions, 2) the use of government spending as an incentive to stimulate post-consumer solid waste reduction measures on the part of manufacturers and 3) regulation. EPA also makes the observation that in the past, federal regulation has been utilized primarily for such reasons as to reduce or eliminate health and safety hazards, to protect the consumer from deceptive practices and to insure free market competition.(131) In a study performed for EPA on the beverage container problem, Research Triangle Institute offered the opinion that federal regulation is justified only under the following conditions(132):

(A) General public welfare is being reduced or threatened.

(B) Individuals outside of government either will not or can not aleviate the cause.

(C) A public policy is available which may be expected to be effective, equitable and have benefits greater than costs.

With this cross section of views and opinions concerning the federal role in post-consumer solid waste reduction efforts, recommendations for federal involvement will now be made.

### 6.11 The Basis for Federal Involvement

To successfully motivate federal legislators to provide the basis for increased national involvement in post-consumer solid waste reduction, such involvement must undoubtedly be shown to be justified by expected, positive impacts upon matters of broad national concern. Merely to prove that actions at the federal level will result in economic benefit to local and state governments is probably not sufficient in the absence of significant pressure at such levels of government for federal action.

Recalling the discussion of the benefits which may be expected to result from successful post-consumer solid waste reduction efforts, several seem to be of significant enough impact on public health and welfare to be considered to be of national importance. Energy conservation, resource conservation, reduced environmental degredation and a more favorable international balance of payments have all been considered to be matters of federal concern in the past and will undoubtedly continue to be so considered in the future. Recognizing this and the fact that post-consumer solid waste reduction may reasonably be expected to result in benefits in these areas, it is recommended that these concerns be addressed as the prime bases for federal actions to stimulate post-consumer solid waste reduction.

### 6.12 Educational Programs

For several reasons, it is recommended that federal public policy actions be confined, at least initially, to educational programs

directed at government, industry, commerce and the consumer and structured to result in voluntary actions to reduce post-consumer solid waste generation. These reasons are:

(A) Educational programs are probably less offensive to the private sector as a whole than the use of direct or indirect regulation.

(B) Educational programs have not yet been utilized extensively in this area and may, in fact, be sufficient to stimulate a degree of post-consumer solid waste reduction that will make regulation at the federal level unnecessary.

(C) Even if unsuccessful in stimulating adequate voluntary post-consumer solid waste reduction, educational programs can serve to increase the general level of public awareness as to the potential benefits of such reduction and, therefore, result in general public support for regulatory actions if required.

Federal educational programs should be directed primarily at lower levels of government, business and commerce and the general consuming public. The differing objectives of these groups and the actions which are within the capability of each group indicate a requirement for considerable variance in the makeup of the specific educational efforts.

6.121 <u>State Government Education</u>. State governments should be kept well informed of the post-consumer solid waste reduction programs implemented in other states and the actual impacts of such programs. This can best be done by the federal government which should act as a clearing house for reports of state post-consumer solid waste reduction

activities. The results of studies of such state programs must be provided to other state governments in a timely manner and in sufficient detail to allow decision makers to evaluate the applicability of specific programs in their particular state. In addition, the federal government should, through publications, seminars, training courses and other means, give evidence to state and local governments of the overall impacts of post-consumer solid waste source reduction, in general, as a potential stimulus for the development of new, previously untested state programs.

Briefly stated, the recommendation is that the federal government convince state governments of the viability of post-consumer solid waste reduction and, thereby, stimulate the formulation and implementation of state programs. The states themselves will serve as proving grounds for various public policies which may, in time, be adopted by other states or even the federal government.

Such a progression of events is currently occurring as regards minimum deposit legislation. Having studied the results of the Oregon law, EPA has concluded that a national policy of this nature would be in the best overall interests of the United States and is currently attempting to convince the Congress of the need for such federal legislation.(16) By allowing individual states to formulate and implement their own special policies for post-consumer solid waste reduction, standardization is sacrificed, but the overall program may be accelerated by allowing regional variations in policy based upon specific conditions prevalent in each state. Reducing the regional scope of policy implementation probably will result in quicker compromise by

special interest groups and more rapid implementation of post-consumer solid waste reduction policies. In the event that this approach does not provide adequate results, national policy implementation remains as an alternative.

6.122 Local Government Education. As regards local governments, it is recommended that the federal government continue and expand its program intended to increase the efficiency of local post-consumer solid waste collection. The direct economic benefit to local governments is likely to be most significant in this area. If efforts to reduce post-consumer solid wastes succeed, local governments must be in a position which allows maximum exploitation of cost reduction potential in the area of collection. Additionally, the federal government should insure that local governments are kept apprised of the better local programs for post-consumer solid waste reduction in use elsewhere. This could be accomplished either by direct contact or via state governments. Such information transfer through state governments offers the benefit of increased emphasis on the state-local relationship in this area of concern, but also allows increased potential for information bottlenecks. None the less, state involvement in this information network is probably advisable from the standpoint of increasing state awareness of local interest in post-consumer solid waste reduction and in reducing the total number of parties with which the federal agency must deal.

6.123 Industry and Commerce Education. With regard to industry and commerce, federal educational efforts should consist of an even more

active exchange of information than described above. It was previously determined that industry and commerce would likely be most interested in the types of post-consumer solid waste reduction measures which would in turn reduce manufacturing or marketing costs. It may be possible to effect agreement between competing manufacturing and marketing firms which result in post-consumer solid waste reduction actions which would not normally be undertaken. Reduction in the use of excessive packaging as a sales gimmick might be a good example, increased product durability another. The federal government could function as a mediator in the negotiation of such agreements as these while at the same time acting to protect the consumers' interest by insuring that unfair market control does not result.

It is also recommended that the federal government increase its efforts in the area of technology transfer among the members of the business and commerce sector. The EPA Source Reduction Fact Sheet discussed previously is an excellent beginning in this area. The texts of several recent Source Reduction Fact Sheets are included for information as Appendix F. Through rapid dissemination of such innovations as reported upon in Appendix F, industry, commerce and the consumer can save money and reduce post-consumer solid waste generation at the same time. Hopefully, initial success as regards the sharing of "business secrets" will prompt increased cooperation by business and commerce with such a program to the eventual benefit of the nation as a whole.

6.124 Consumer Education. General consumer education as to the problems to be overcome by, and the currently recognized methods of, post-consumer solid waste reduction, including, but not limited to, consumption habits and patterns (the alteration of which is within the capability of each consumer), is recommended as a part of the proposed federal educational program. Such consumer education could be best accomplished by utilizing the many consumer and environmental groups already in existence as a mechanism to reach the consumer. EPA has prepared information packages intended to answer typical consumer questions on specific policies such as minimum beverage container deposit legislation; but, to date, such consumer information packages have been the exception rather than the rule. Increased federal reliance upon such techniques to inform the consumer in the area of post-consumer solid waste reduction are recommended with provision of the kind of information package mentioned above to concerned groups as a convenient mechanism for dissemination to the general public.

If legislative action should, in the long run, be deemed desirable in order to attain maximum benefit from post-consumer solid waste reduction, a better informed public would exist and may increase the likelihood of successful legislation through individual contacts with legislators. It is also possible that business and commerce could be motivated toward post-consumer solid waste reduction actions by way of consumer demands for changes in packaging or products available in the market place.

### 6.13 Federal Studies

It is extremely unlikely that any level of government other than the federal government will undertake studies of the national impacts of post-consumer solid waste reduction actions. The importance of such studies as methods of estimating overall impacts, identifying problem areas requiring special consideration and serving as the basis for smoother policy implementation can not be overstated.

It is recommended that the federal government study, in detail, alternative strategies for post-consumer solid waste reduction, including economic penalties or incentives, and packaging or product standards. Included in such studies should be analysis of such factors as energy consumption, resource depletion, solid waste generation, air and water pollution emissions and effluents, employment, consumer cost and overall economic impact. Even if national regulation is never required, such studies could serve as a basis for evaluating the national effects of actions taken by one or more individual states.

Also recommended is federal study of the actual results of individual state strategies for post-consumer solid waste reduction. While such studies will probably be conducted eventually by the appropriate states, data may not be available for an extended period of time after becoming measurable, and such a condition could result in the early implementation of an unsuccessful program in other states or in the delay of implementation of a highly successful one. Additionally, federal study of such state programs will serve to broaden federal understanding of the intricacies involved in the specific state programs,

thereby allowing the federal government to more readily perform as an information and technical knowledge source.

An additional area of federal study is recommended. There exist federal regulations which inhibit post-consumer solid waste reduction. As an example, the Food and Drug Administration (FDA) will not permit Kentucky Fried Chicken to ship poultry in reusable containers.(133) Since this chain uses 9 percent of all poultry raised for meat in the United States, its huge packaging requirements can not be reduced by reuse until the FDA changes the rules it now considers necessary. The above example probably represents only the tip of the iceberg. A federal study to identify such impediments to post-consumer solid waste reduction efforts and to work toward acceptable compromises is recommended.

### 6.14 Other Non-Legislated Federal Actions

It is recommended that the federal government reserach the ramifications of the use of its own purchasing power to stimulate and test post-consumer solid waste reduction measures. The federal government could stimulate tire retreading by specifying retread tires in federal purchases. The federal government is one of the single largest purchasers of packaging. Special consideration could be given packaging manufacturers who can meet certain standards of reduced resource intensivity in packaging materials. The same could be true in the case of consumer goods sold through the many federal retail outlets.

In addition, the federal government could test actual post-consumer solid waste reduction measures in federal agencies and military

communities. A recent Pittsburgh Press article reports on such a current development. EPA has recently proposed guidelines which will require a five cent deposit on every carbonated beverage container sold at a federal installation. Such sales are estimated to be from two to four percent of total annual United States sales volume.(134) While minimum deposit requirements are hardly untested, the above is an example of the types of action which can be tested in federal agencies without the need for legislation. Such applications are highly recommended as means of compiling data on actual impacts on the post-consumer solid waste stream and consumer buying patterns of specific waste reduction techniques.

### 6.15 Federal Regulation

In the event that educational programs and non-legislated federal actions do not prove adequate to stimulate voluntary post-consumer solid waste reduction efforts to a degree sufficient to obviate the need for national regulation as indicated by the federal studies which have been recommended, the ultimate federal role is such regulation.

Federal regulation is recommended as the last federal recourse for several reasons. First, the argument that the federal government is the only entity capable of requiring action from certain overall sectors of the economy probably must be accepted as true. In the event that industry and commerce can not be influenced to voluntarily take actions such as to eliminate excessive packaging, increase product lifetimes, reduce resource intensivity and, in general, present the consumer with choices which will allow him to alter his buying habits to

the end of post-consumer solid waste reduction; federal regulation, or the threat thereof, may be the only alternative. Additionally, once specific regulatory policies, such as required minimum deposits on beverage containers, have been proven to be of net social benefit by state implementation and utilization as well as additional study, the federal government would undoubtedly be remiss in the performance of its function if it did not at least consider such regulation at the national level. Finally, standardization of such policies nationwide offers increased ease of administration and maximizes the level of benefit to be achieved.

Federal regulatory actions intended to result in post-consumer solid waste reduction must be cautiously adopted. As indicated previously, the potential for economic disruption is great and care must be taken to insure that federal regulatory actions may reasonably be expected to have overall benefits greater than costs.

## 6.2 The State Government

### 6.21 The Basis for State Government Involvement

As has undoubtedly already been surmised, state involvement in post-consumer solid waste reduction to date has been based primarily upon recognition by the various states of the social costs of litter and of the responsibility of the state to take corrective action in this area. In addition to the above, state interest in post-consumer solid waste reduction is undoubtedly based upon the reduction of local governments' costs of solid waste management, the reduction of adverse

environmental impacts and the net effects of specific post-consumer solid waste reduction activities upon employment within the state. Secondarily, state governments should also be concerned with the energy and resource conservation impacts.

### 6.22 Educational Programs

In addition to functioning as the educational link between federal and local governments mentioned in the discussion of federal educational programs, state governments should strive to inform the consumers of the benefits to be gained through post-consumer solid waste reduction. To this end, state governments should utilize the services of various environmental and consumer groups in the same manner as suggested for the federal government. Additionally, state regulatory agencies should work with industry and commerce within the state to demonstrate the overall benefits available to them through post-consumer solid waste reduction and to insure that the results of successful efforts in other such industries and businesses elsewhere are given maximum exposure.

As regards local governments, it is also recommended that state governments insure the availability of the best information which can be assembled pertaining to local programs and legislation for post-consumer solid waste reduction. Many city and county governments are now implementing and testing a wide variety of local programs which can be utilized as a basis for similar programs elsewhere. In order to fulfill this responsibility, each state government must remain abreast of developments within its jurisdiction and provide information on such

to all other state governments. In this manner, all states will be continously informed of the developments in local government actions to reduce post-consumer solid wastes and be in a position to provide such information to local governments within their jurisdiction.

### 6.23 State Studies

Logic similar to that stated as a basis for national studies of the effects of various post-consumer solid waste reduction measures indicates that individual states should also perform such studies. State governments must not be surprised by the statewide effects of local or state actions.

At the same time, state representatives in the federal legislature must be provided the information necessary for them to rationally argue for or against proposed federal post-consumer solid waste reduction programs. In order to so perform, these federal legislators must be provided the results of studies performed specifically to evaluate the impacts of selected measures upon the individual state. As discussed previously in this paper, federal studies tend to result in analysis of actions based upon overall national benefits and costs and do not necessarily insure that benefits will exceed costs in each of the fifty states. If individual states do not assess such impacts, they may very well not be addressed until they are obvious and, perhaps, extremely difficult to control. It should be noted that the fact that at least the states of Maryland, Minnesota, New York, Connecticut, Illinois, Michigan and Main have evaluated the impacts of minimum deposit legislation upon them would seem to indicate that the need for such studies

is more than a minority view.(44)

During a conversation with Mr. Michael Loube of EPA's OSWMP, mention was made of the fact that many states currently license packaging and container types and sizes for use within their jurisdiction.(45) Where this is the case, it is recommended that the state government review such regulations in order to eliminate potential road blocks to post-consumer solid waste reduction measures and to identify means of using existing regulations to stimulate such measures. Recalling the previously mentioned redesigned half-pint milk container, it can be seen that such regulations as described above could definitely be used to result in post-consumer solid waste reduction.

### 6.24 Other Non-Legislated State Actions

As was recommended in the case of the federal government, state governments should consider the use of their own purchasing power to stimulate and test post-consumer solid waste reduction measures. State governments can also test the actual effects of selected actions by implementation in state controlled facilities, for example in prisons, hospitals, mental facilities and other residential-like environments as well as the more numerous state government buildings.

### 6.25 State Legislation and Regulation

State legislation may frequently be required to allow local governments to take post-consumer solid waste reduction measures not currently within local legislative authority. It is strongly recommended that as such instances arise, states evaluate the overall impacts

and, as appropriate, remove legislative obstacles in the paths of local government programs.

Additionally, states which feel strongly that certain actions will result in overall benefit within their jurisdictions are encouraged to take the steps necessary for implementation. In addition to benefiting the specific state, such actions could provide the data necessary for evaluation of the national impacts of similar measures and serve to stimulate voluntary actions which are of broader national benefit. For example, the adoption of a ban on the detachable "pull-top" beverage can opener in the State of Oregon is said to be the reason that this readily littered type of opener will probably disappear from use in the United States in the next two to four years.(135) While not a significant post-consumer solid waste reduction measure, the above does indicate the potential for the actions of a single state to result in spill over benefits to the nation as a whole.

Specific examples of state legislation directed at the post-consumer solid waste stream are not numerous as yet. In addition to the previously mentioned minimum deposit legislation enacted in the states of Oregon, Vermont and South Dakota and the litter tax in force in the state of Washington, Minnesota has passed a law which places certain requirements on new or redesigned packaging. All new or redesigned packaging intended for use in the Minnesota market must be approved by the Minnesota Pollution Control Agency. Such approval is based upon potential toxicity or harm; energy and materials use; recyclability; impacts on consumers, labor and industry; and alternative forms of packaging available and of reduced overall impact. By

implementing the above law, Minnesota is serving much as a test case for such legislation. The impacts of this law should be carefully studied as a basis for increased state and, perhaps, federal implementation.

The existence of more concerned and adventurous states such as those mentioned above may very well be the impetus which results in a major national effort to reduce post-consumer solid wastes and the associated adverse impacts.

## 6.3 The Local Government

### 6.31 The Basis for Local Government Involvement

It is the local government that will realize the direct cost savings in the areas of solid waste collection and disposal which post-consumer solid waste reduction measures may generate. Local governments will be a principal beneficiary of litter reduction also. Due to the highly localized negative impacts of some post-consumer solid waste reduction measures, for example employment reductions or industry closures, the local government may also be significantly impacted upon in terms of employment and tax revenue. For the above reasons, local governments must be concerned with post-consumer solid waste reduction measures, particularly legislated policies. The impacts upon local governments could be quite extreme.

### 6.32 Educational Programs

By virtue of relative proximity, local governments undoubtedly can produce the most significant results in consumer education programs. For this reason it is recommended that local governments work closely with the environmental and consumer groups previously suggested as the educational program workforce.

As a means of educating the consumer as to the true dollar cost of solid waste collection and disposal, or at least rewarding the consumer for waste reduction in the event user charges do not generate all solid waste management funds, user fees which will reflect the degree of service rendered are highly recommended. One relatively easy means of accomplishing this, the municipally sold garbage bag, was previously discussed. The problem of illegal dumping can be controlled with strict enforcement. The argement of the existence of those that can not afford to pay for such service is more complicated but solutions can undoubtedly be found. The fact that user charges are assessed in over one-third of U. S. cities of populations under one-half million would seem to indicate that the above problems are not insurmountable.(123)

### 6.33 Local Government Studies

The relatively great impact upon local governments which can result from post-consumer solid waste reduction measures dictates that local governments have some concept of the effects of such actions. Studies required to estimate these effects would, in all likelihood,

be of considerably less detail than state or federal studies but, to the level of government involved, would be of at least equal value.

Additionally, the value of the results of studies of the actual effects of local measures to reduce post-consumer solid waste has been previously estimated to be considerable. If state governments are to be provided with such information so that they can fulfill their recommended educational function, local governments must undoubtedly provide it. The required detail of these studies is of a lower level than most other studies recommended herein and should prove no great burden for local governments, with the possible exception of the local jurisdiction of greater population. These larger local governments should possess greater talent in the solid waste management area and, thus, be more capable of studies of broader scope and greater detail.

### 6.34 Other Non-Legislated Local Government Actions

With lesser individual impact than federal and state governments, local governments can also utilize purchasing power to stimulate post-consumer solid waste reduction measures. The impact of such wide scale action on the part of local governments could potentially be as great as that of any single state or of even the federal government.

In order to receive maximum benefit from successful post-consumer solid waste reduction efforts, the level of efficiency of local government solid waste management programs must be maximized. Local governments must make every effort to upgrade the efficiency of collection and disposal operations. By so doing, reductions in the per capita generation of post-consumer solid wastes can be taken

advantage of in an expeditious manner through rerouting and other internal management adjustments. Actual savings in these areas are extremely dependent upon the local government's individual ability to adjust to decreased consumer solid waste generation.

It is highly recommended that local governments which contract for solid waste collection and disposal, include in such contracts provision for payments to contractors on the basis of weight of post-consumer solid waste collected and disposed of. While it is recognized that such contract provisions are generally felt to have the undesirable effect of reducing the predictability of annual solid waste management costs, they will allow the greatest dollar savings benefits to the local government in the event that post-consumer solid waste reduction can be successfully implemented.

Additionally, if, in view of the constraints previously discussed, the use of garbage grinders to reduce the food waste portion of the post-consumer solid waste stream appears to be of overall benefit, such is recommended. User charges, in the case of both solid waste services and garbage grinder utilization, can be set at levels which, in conjunction with an educational program to indicate the direct consumer savings which can be realized, will result in wide scale garbage grinder use without a legislated requirement therefor. Such a situation, in conjunction with contract solid waste collection and disposal services which are billed on the basis of the actual weight of solid waste removed, could significantly reduce the solid waste management costs of the respective local government.

### 6.35 Local Legislation and Regulation

The value of local legislation and regulation as a direct means of reducing post-consumer solid waste is questionable. It is very unlikely that any single local government ordinance will have significant effects. However, the value of such local legislation as a means of testing the impact of certain methods is potentially very great. Additionally, local efforts serve as an excellent means of increasing public consciousness as relates specifically to post-consumer solid waste reduction. On this basis, such local legislation and regulation is recommended.

As early as June of 1971, 88 local governments in 28 states were considering beverage container regulation.(136) By 1975, the local governments of Bowie, Maryland; Oberlin, Ohio; Howard County, Maryland; Loudoun County, Virginia; Cayuga County, New York; and many others had implemented such legislation.(137) Such efforts as those expended in the above local governments have probably done as much as any program to date to bring the benefits of post-consumer solid waste reduction to the attention of the various levels of government and of the general public as a whole.

## 6.4 Political Considerations

A discussion of the roles of the various levels of government can not be concluded without recognizing the political considerations of public policy decisions. The requirement for detailed investigations of the impacts of specific policy measures upon all sectors of the

economy, both at the micro and macro levels, has been recognized. It must also be noted that the fact that such studies lead to the prediction of net economic benefit does not necessarily insure political viability. Public policy decisions are made by individuals under the control of popular emotions and prejudices and the need to get reelected. They are also highly susceptible to the powerful influences of special interest groups.

The fact that a public policy technique is expected to result in overall benefit at some time in the future may be of little consequence to the politician. Major, and even minor, public policy changes involve risk. Those benefited are seldom grateful for long, and those adversely impacted seem to remember forever. In the political mind, benefits which are expected to be realized at a point in time subsequent to the next election do not serve to balance out costs which will be felt immediately. Quite often the political costs of alienating the employees, even though few in number, of the factory which is closed as a result of a specific policy decision expected to benefit a large number of people (for example a product ban) are adequate to make such a policy undesirable in the mind of the elected official. Additionally, political tradeoffs are often made which sacrifice the interests of the majority for those of the minority. Whether the above is morally correct or incorrect is not an issue here. It is important only to recognize the fact that such activities are as much a part of policy making as the benefit to cost ratio, if not more.

Acceptance of the above argument leads to an even stronger case for reliance upon the suggested educational programs as means of

stimulating voluntary actions to reduce post-consumer solid wastes. Indeed, due to the relatively slow pace at which government usually reacts to the need for new public policy, the stimulation of voluntary actions may be the only option available in the short term.

# 7.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## 7.1 Summary and Conclusions

This thesis has been an effort to investigate the need for and the viability of post-consumer solid waste reduction as a means of lessening the adverse economic, environmental and natural resource depletion impacts of solid waste disposal by the local government. The more frequently suggested techniques, both legislated and non-legislated, which might be used to stimulate post-consumer solid waste reduction have been examined. This effort has been hampered somewhat by the almost total lack of written material dealing with the actual or expected effects of all post-consumer solid waste reduction measures except minimum beverage container deposit legislation.

### 7.11 Resource/Energy Recovery

The Federal Resource Recovery Act of 1970 amended the Federal Solid Waste Disposal Act of 1965 and placed great emphasis upon resource/energy recovery as a means of solving urban economic and environmental solid waste disposal problems as well as conserving energy and natural resources. Studies recently performed indicate that maximum practical implementation of resource/energy recovery by 1990 will result in the processing of only about 49 million tons of municipal solid wastes in that year, a quantity less than the expected growth in the post-consumer solid waste stream between now and then.

Markets have been slow to develop for recovered materials and combustible wastes and have been very unstable. Many laws and regulations, such as depletion allowances and freight rates, present obstacles to resource/energy recovery which will be difficult to remove. The relatively large quantities of solid wastes which must be generated to support a resource/energy recovery operation (200 to 250 tons per day requiring a population in the area of 100,000 at current per capita generation rates) and the fact that resource/energy recovery must compete economically with the lowest cost alternative method of disposal probably can be presumed to mean that this option will not be economically feasible for many local governments for a considerable period of time, if ever.

The following conclusions have been drawn based upon the examination of the potential of resource/energy recovery:

(A) While resource/energy recovery can result in 1) a reduction of the environmental degradation due to solid waste disposal, 2) return of natural resources to the use cycle and 3) reclamation of energy from combustible materials; there are many obstacles in the path of implementation on a nationwide scale.

(B) If reduced local solid waste management costs, greater resource and energy conservation and increased reduction in the environmental degradation resulting from solid waste disposal is desired in the immediate future and for local governments without restrictions as to size; there is a need for a program to work as a partner of resource/energy recovery.

## 7.12 Post-Consumer Solid Waste Reduction as a Concept

In 1972 interest began to develop at the federal level in the concept of reducing the waste flow as a technique which would pay the same kinds of dividends as resource/energy recovery. Several more adventurous state governments also began to embrace the idea. The logic of reducing the waste flow to the extent practical and then recovering as much of the remainder as possible began to take hold.

While resource/energy recovery can impact favorably upon the adverse environmental effects and costs of solid waste disposal and will return some amount of natural resources to use, post-consumer solid waste reduction can theoretically eliminate part of the solid waste stream directly. By reducing the production of goods which become waste, the level of positive impact in the above areas can be greatly increased and broadened. Not only are the environmental impacts of disposal reduced, environmental degradation as a result of the production and delivery of goods is reduced. Resources and energy are saved directly without the need for recovery operations. Post-consumer solid waste reduction can result in savings in the area of solid waste collection and disposal while resource/energy recovery impacts only upon the disposal costs. Additionally, reductions in the use of imported materials, such as aluminum, tin and iron ore, would favorably improve the U. S. international balance of payments.

Theoretically, post-consumer solid waste reduction can pay dividends far greater than those available through resource/energy recovery alone and could give these benefits to all, instead of only the

larger governments. However, post-consumer solid waste reduction is premised upon the reduced consumption of goods. The potential for adverse impacts upon the United States' economy is great. Employment, the cost of consumer goods, the viability of resource/energy recovery operations and tax revenues are but a few areas that could be adversely impacted by reduced consumption. Other problems exist also. Behavior patterns must undoubtedly be changed. Legislation and regulation may be required. Political constraints may be insurmountable.

The following conclusions have been reached as regards post-consumer solid waste reduction:

(A) Post-consumer solid waste reduction is a means which theoretically can be used as a partner of resource/energy recovery in reducing local government solid waste disposal problems, decreasing the waste and depletion of natural resources and lessening the adverse environmental impacts of solid waste disposal.

(B) Post-consumer solid waste reduction measures can have far reaching impacts in areas other than those intended. Considerable study will be required to determine the kinds and magnitudes of all such impacts.

(C) Post-consumer solid waste reduction measures can be expected to be opposed by business and industry. Any actions, particularly legislated ones, which attempt to reduce consumption will undoubtedly be seen as undue government interference in the market place and will probably be vigorously opposed by those businesses and industries which will be adversely effected.

(D) Legislation of post-consumer solid waste reduction measures, particularly at the federal level, will be difficult. Even if detailed studies indicate that adverse economic impacts can be controlled or softened to the extent that overall economic benefits are greater than costs, political costs and risks may block successful legislation.

## 7.13 Developments to Date in Post-Consumer Solid Waste Reduction

The Office of Solid Waste Management Programs of the United States Environmental Protection Agency has identified three feasible technical alternatives which, if possible to implement or cause to be implemented, will result in post-consumer solid waste reduction. These technical alternatives are as follows:

(A) Increased product reuse--This refers primarily to the substitution of reusable items for single use disposables, such as containers and non-durable goods designed for a single use.

(B) Reduced resource intensivity--This refers to the reduction of the amounts of material and energy required to manufacture a product without sacrificing the products capability to perform the function intended. As an example, the redesign of a container which results in delivery of the same quantity of product with decreased container or outer carton material required would result in reduced resource intensivity. The elimination of excessive packaging, packaging which serves no practical purpose, would have a similar result.

(C) Increased product lifetime--This refers to increases in a product's useful life which will allow it to remain in service for a

longer period of time, thereby resulting in a reduction in per capita discard per unit of time for the specific product. This approach is usually felt to be most applicable to durable goods such as appliances, furniture, automobile tires, etc.

The major public policy options which have been or are being considered as means of stimulating or requiring changes in the habits of the manufacturer, retailer and consumer with the end result of increased implementation of the technical options presented above are as follows:

(A) Educational programs--Programs intended to stimulate action by manufacturers, retailers and consumers based upon the theory that if the benefits to be derived from certain actions can be made known and are of direct enough impact, such as reduced cost, these actions will be taken voluntarily. EPA has begun efforts of this nature through their Source Reduction Fact Sheets which inform business and commerce of actions taken by their counterparts which have resulted in post-consumer solid waste reduction with no increases or, in some cases, decreases in operating costs. Additionally, through its many publications, EPA is providing information on post-consumer solid waste reduction to state and local governments. Due to the apparent lack of detailed studies on post-consumer solid waste reduction measures other than minimum beverage container deposit mechanisms, the depth of such information leaves a great deal to be desired.

(B) Deposit mechanisms--Deposit mechanisms are felt to have potential as a means of concentrating products for reuse or salvage, thus keeping them from entering the waste stream. One major obstacle

in the path of salvage or recovery operations is the need to collect and sort the items of interest. Deposit mechanisms can serve as a stimulus to the consumer to perform this function. Minimum beverage container deposit mechanisms have been studied extensively at the state and national level and implemented by some local and state governments. EPA is now functioning as the sponsor of national legislation of this type. Deposit mechanisms in non beverage container applications have not yet been investigated in detail but show potential as a means of stimulating post-consumer solid waste reduction. It appears that the major problems in this area are the development of the mechanism to accept and reuse or salvage the products and stimulating the general public to participate.

(C) Taxes--Taxes, primarily upon packaging, have been suggested as methods of including, for redistribution to local governments, the costs of product disposal in the purchase price. Additionally, the application of taxes to deter the use of certain types and excessive quantities of material has been discussed. Preliminary studies indicate that such taxes offer potential as a means of generating solid waste management funds but are of questionable benefit to post-consumer solid waste reduction. Administrative mechanisms for collection and redistribution of these tax revenues could be quite cumbersome.

(D) Bans--Outright bans of certain kinds of products, for example non-returnable beverage containers or plastic packaging, have been suggested. Major problems in this area are the determination of the level of societal damage necessary to justify a ban, the adverse economic impact of a product ban (processes and equipment immediately

become obsolete), the mechanism required to implement and enforce a ban, and the political uncertainties in attempting to legislate a ban. No detailed studies of the effects of product bans have been located.

(E) Design regulations and performance standards--These actions could be taken to increase product life or make products more repairable or salvagable. Problems in this area involve the extensiveness of the enforcement mechanism required, the lack of background knowledge upon which to base such regulations or standards and the uncertain effects they would have on the U. S. economy. Once again, detailed analysis of the impacts of such actions was found to be non-existent.

(F) Solid waste collection and disposal user charges--As an added stimulus to the consumer to be concerned with the quantity of solid waste generated, the application of solid waste collection and disposal user charges which reflect the quantity and level of service received has been suggested. Research has shown that such a practice is not widely used but is in existence primarily in smaller local governments. The municipally sold plastic trash bag was cited as one technique. Problems identified in this area are the possibility that some consumers simply can not afford to pay their fair share and that promiscuous dumping may result. The fact that such problems are not insurmountable is suggested by current utilization of this technique in some municipalities in the United States. The need for motivation of the consumer toward post-consumer solid waste reduction by cost incentive was stressed very strongly by the local government officials interviewed. Also mentioned was the political risk involved in asking the public to pay for a service which had been previously financed from

indirect sources.

Several state and local governments have implemented legislation requiring minimum deposits on beverage containers. This legislation has been based primarily upon the need to reduce litter. After several years of experience with such a law, the State of Oregon has concluded that the public generally accepts and cooperates with such an approach; litter is reduced, economic impacts are not unacceptable and a shift to reusable containers results. Additionally, one provision of the Oregon law, a ban on the detachable pull-top opener, has resulted in the development of alternatives which are expected to be introduced nationwide. The success of the Oregon law has been a major factor in the decision of EPA to push for such a law on the national level.

A program of reuse of shopping bags, egg containers and other items which has been implemented in one supermarket chain has shown that small cost savings are adequate to stimulate the consumer to reuse items normally discarded, thereby slightly reducing the flow of such items into the post-consumer solid waste stream. EPA has reported the success of this program to other potential users in a Source Reduction Fact Sheet.

The results of EPA studies of the 1973 post-consumer solid waste stream intended to give better estimates of per capita solid waste generation and the overall makeup of post-consumer solid wastes were presented. The general categories of post-consumer solid waste, as presented by EPA, are as follows:

(A) 35% of the waste stream consists of containers and packaging. Included in this 35% are beer and soft drink containers which

make up about 1/6 of this category.

(B) 18% of the waste stream consists of non-food, non-durable goods.

(C) 11% of the waste stream consists of durable goods.

(D) 36% of the waste stream consists of food and yard wastes.

Also noted was the fact that some recycling is currently being accomplished as follows:

(A) Tires are recycled at a rate of 10%.

(B) Newspapers are recycled at a rate of 24%.

(C) Books and magazines are recycled at a rate of 9%.

(D) Office paper is recycled at a rate of 15%.

(E) Paper and paperboard packaging are recycled at a rate of 18%.

Increases in the per capita consumption of various types of packaging over the last few years were also discussed. It was found that significant increases have occurred in the consumption of packaging in general and specifically in beverage containers, the per capita consumption of which has increased nearly 500% since 1955.

The following conclusions have been reached based upon the developments to date in post-consumer solid waste reduction:

(A) The EPA is definitely interested in post-consumer solid waste reduction as a partner technique to resource/energy recovery but has only just begun to formulate a plan.

(B) Educational programs are much more easily implemented than legislated methods intended to reduce post-consumer solid wastes. Educational measures intended to stimulate post-consumer solid waste

reduction are currently being used by EPA.

(C) State and local governments are capable of more rapid post-consumer solid waste reduction legislation than the federal government since constraints are more easily measured and internal impacts more easily estimated. Such state and local legislation can result in spill-over benefits to larger regions, even the nation as a whole, and can serve as pilot programs for the gathering of data and information to the end of evaluation of the possibility of broader application of such legislation.

(D) Solid waste collection and disposal user charges can serve to stimulate consumer interest in post-consumer solid waste reduction. The application of user charges, while not problem free, is within the capability of most local governments.

(E) The detailed impacts of and constraints to most methods of stimulating post-consumer solid waste reduction have not been estimated or measured. Much work remains to be done prior to the identification of specific measures, particularly legislated ones, which can best be used.

(F) Due to recent major increases in and the per capita consumption of the large portion of the overall post-consumer solid waste stream which consists of containers and packaging, as well as the fact that such items are usually purchased to be thrown away almost immediately, this category of waste presents the best initial target for post-consumer solid waste reduction.

(G) Items which are available in concentrated quantities, such as tires, office paper and paper and paperboard packaging, are more

frequently directly reclaimed than those which remain dispersed. Concentration can result in the elimination of certain items from the waste stream through direct reclamation.

## 7.2 Recommendations

It will undoubtedly be recalled that a number of recommendations were made in section 6 with regard to the roles of the various levels of government in post-consumer solid waste reduction. Rather than restating them here in the same detail as originally presented, a summary will be included. Greater detail may be found in section 6.

### 7.21 Detailed Studies of the Practical Viability of Post-Consumer Solid Waste Reduction

A very obvious requirement exists with respect to the types of information necessary to serve as a basis for approaches which can be used in any post-consumer solid waste reduction program. The studies performed to date indicate that post-consumer solid waste reduction warrents further investigation from the standpoint of potential benefit and requires further study due to the broad range of potential adverse economic impacts. For these reasons, studies intended to fully identify the expected impacts, both beneficial and adverse, of post-consumer solid waste reduction in general and of the specific mechanisms which may be utilized are recommended. To this end, the following specific recommendations are made:

(A) It is recommended that the federal government, through the Office of Solid Waste Management Programs of the Environmental Protection Agency, perform detailed studies to identify the national and significant regional and private sector economic impacts of post-consumer solid waste reduction measures in an effort to identify those of most overall benefit. Additionally, the identification of adverse economic impacts upon specific regions or private sectors is recommended in order to facilitate special measures to soften such impacts.

(B) It is recommended that the EPA encourage state and local governments to perform studies similar to those suggested in (A) above but to evaluate impacts within the appropriate jursidictions. EPA should, after preliminary study, suggest several specific mechanisms expected to be most feasible for such state and local study as a part of an overall national feasibility study.

(C) It is recommended that the EPA insure that actual impacts of state and local post-consumer solid waste reduction measures which have been implemented are studied and evaluated. This could be accomplished by EPA directly or by the appropriate state and local governments. Such measures by lower levels of government hold great potential as true life test cases which can provide actual data on the effects of specific actions, whether legislated or voluntary.

(D) It is recommended that all levels of government study and review existing laws and ordinances which tend to inhibit post-consumer solid waste reduction or which could be used to stimulate such action. State packaging laws and federal health laws have been identified as offering potential in this area.

(E) Finally, it is recommended that the Office of Solid Waste Management Programs in the United States Environmental Protection Agency be the lead organization in assembling and distributing the results of the studies recommended above.

## 7.22 Educational Programs

The use of an educational program as a portion of the overall post-consumer solid waste reduction effort is very strongly recommended due to the following reasons:

(A) Educational programs are intended to stimulate voluntary action and are therefore usually less offensive to the private sector as a whole than direct or indirect regulation.

(B) Educational programs may, in fact, be sufficient to obviate the need for other measures.

(C) Even if unsuccessful in stimulating adequate post-consumer solid waste reduction, as determined by comparison with results available through legislated measures, educational programs can make eventual use of legislated methods more acceptable by raising the level of public consciousness in this area.

(D) Educational programs can be put into use as soon as facts are available without the need for the slow process of legislation. Benefits, though probably of reduced quantity, can be realized relatively rapidly.

The following actions are recommended as basic components of the educational program discussed above:

(A) It is recommended that EPA, through the state and local governments, insure a continuous two way flow of information concerning studies (planned, under way or completed), measures taken throughout the United States and the results thereof. Additionally, programs designed to inform the consumer of the basis for his interest in post-consumer solid waste reduction should be implemented. It is additionally recommended that environmental and consumer groups be enlisted to work closely with the federal, state and local governments in this effort.

(B) It is recommended that EPA continue and increase efforts to insure that the efficiency of local government solid waste and collection services is maximized. Additionally, it is recommended that local governments be strongly encouraged to insure that contract costs for such services be incurred on the basis of the actual weight of solid waste collected. Implementation of the above recommendations will help to insure maximum economic benefit to local governments from successful post-consumer solid waste reduction measures.

(C) It is recommended that EPA and the state and local governments work with industry and commerce in an attempt to effect voluntary actions on their parts as relates to the manufacture and sales of consumer goods and which will result in post-consumer solid waste reduction. Included in these efforts would be provisions for the rapid flow of information concerning such steps taken by other members of the industry and commerce sector.

(D) It is strongly recommended that local governments be encouraged to move to user fees for post-consumer solid waste collection

and disposal which would reward the consumer who takes steps to reduce generation. Private citizen interest in post-consumer solid waste reduction can almost certainly be stimulated by such measures.

### 7.23 Other Non-Legislated Actions

The following actions which could also be taken in an effort to stimulate post-consumer solid waste reduction measures are also recommended:

(A) It is recommended that all levels of government investigate the feasibility of utilizing their own purchasing power as a means of stimulating post-consumer solid waste reduction. The federal government in particular is a large purchaser of packaging and could reward innovation which results in reduced packaging. All levels of government can purchase in such a manner as to reward reduced resource intensivity.

(B) It is recommended that all levels of government consider the use of government facilities as test areas for certain post-consumer solid waste reduction measures. The federal government is now so doing in the case of minimum beverage container deposit mechanisms. In this manner, the effects of legislated actions upon post-consumer solid waste generation can be tested without the need for legislation.

### 7.24 Legislation and Regulation

Legislation and regulation have been held for discussion last primarily because it is felt that such measures should be implemented, particularly at the national level, only as a last recourse. It is recognized that legislation and regulation may be necessary to effect

post-consumer solid waste reduction but the studies recommended earlier must serve as the basis for such measures. With the above in mind, the following recommendations are made:

(A) It is recommended that state governments consider carefully the impacts of enabling legislation to allow local governments to take measures intended to result in post-consumer solid waste reduction and, to the maximum extent possible, grant such authority. Individual local government actions have questionable value as methods of actually reducing post-consumer solid waste generation but have been shown to be of great value as a means of increasing the level of general awareness of the benefits to be gained from such measures.

(B) It is recommended that state and local regulation and legislation to the end of post-consumer solid waste reduction be encouraged on the basis of better meeting local requirements than national action and serving as test cases for the evaluation of impacts in the event of broader application.

(C) It is recommended that federal regulation and legislation be delayed until the total impact of such actions can be evaluated, planned for and shown to be in the overall national best interest at a high level of confidence.

# APPENDIX A

## POTENTIAL CANDIDATE AREAS (SMSA'S) FOR RESOURCE/ENERGY RECOVERY IN 1974

| | Standard Metropolitan Statistical Areas | Population 1970 (thousands) |
|---|---|---|
| 1. | New York, New York | 11,572 |
| 2. | Chicago, Illinois | 6,979 |
| 3. | Philadelphia, Pennsylvania | 4,818 |
| 4. | Detroit, Michigan | 4,200 |
| 5. | Washington, D.C. - Md. - Va. | 2,861 |
| 6. | Boston, Massachusetts | 2,754 |
| 7. | Pittsburgh, Pennsylvania | 2,401 |
| 8. | St. Louis, Missouri | 2,363 |
| 9. | Baltimore, Maryland | 2,071 |
| 10. | Cleveland, Ohio | 2,064 |
| 11. | Newark, New Jersey | 1,857 |
| 12. | Minneapolis - St. Paul, Minnesota | 1,814 |
| 13. | Milwaukee, Wisconsin | 1,404 |
| 14. | Atlanta, Georgia | 1,390 |
| 15. | Cincinnati, Ohio | 1,385 |
| 16. | Patterson, New Jersey | 1,359 |
| 17. | San Diego, California | 1,358 |
| 18. | Buffalo, New York | 1,349 |
| 19. | Miami, Florida | 1,268 |
| 20. | Denver, Colorado | 1,228 |
| 21. | Portland, Oregon | 1,009 |

## APPENDIX A (cont.)

| | Standard Metropolitan Statistical Areas | Population 1970 (thousands) |
|---|---|---|
| 22. | Columbus, Ohio | 916 |
| 23. | Providence, Rhode Island | 911 |
| 24. | Rochester, New York | 883 |
| 25. | San Antonio, Texas | 864 |
| 26. | Louisville, Kentucky | 827 |
| 27. | Memphis, Tennessee | 770 |
| 28. | Albany, New York | 722 |
| 29. | Toledo, Ohio | 693 |
| 30. | Akron, Ohio | 679 |
| 31. | Hartford, Connecticut | 664 |
| 32. | Gary, Indiana | 633 |
| 33. | Jersey City, New Jersey | 609 |
| 34. | Nashville, Tennessee | 541 |
| 35. | Jacksonville, Florida | 529 |
| 36. | Wilmington, Delaware | 499 |
| 37. | Knoxville, Tennessee | 400 |
| 38. | Bridgeport, Connecticut | 389 |
| 39. | New Haven, Connecticut | 356 |
| 40. | Peoria, Illinois | 342 |
| 41. | Little Rock, Arkansas | 323 |
| 42. | Chatanooga, Tennessee | 305 |
| 43. | Madison, Wisconsin | 290 |
| 44. | Rockford, Illinois | 272 |

## APPENDIX A (cont.)

| | Standard Metropolitan Statistical Areas | Population 1970 (thousands) |
|---|---|---|
| 45. | Lawrence, Massachusetts | 232 |
| 46. | Charleston, West Virginia | 230 |
| 47. | Eugene, Oregon | 213 |
| 48. | Brockton, Massachusetts | 190 |
| | Total Population, 1970 | 71,786 |
| | Total Population, 1980 | 78,462 |
| | Waste Generation, 1980 (annual) | 62.0 million tons |
| | (daily) | 170 thousand tons |

Source: Energy Conservation Through Improved Solid Waste Management, U. S. Environmental Protection Agency, Washington D. C., 1974, pp. 18 and 19.

# APPENDIX B

## PROJECTED IMPLEMENTATIONS OF RESOURCE/ENERGY RECOVERY SYSTEMS BY 1980

| State | City | Tons of Solid Waste Per Day (1980) |
|---|---|---|
| California | San Diego | 200 |
| Connecticut | Bridgeport | 1,200 |
| District of Columbia | Washington | 1,000 |
| Illinois | Chicago | 2,000 |
| | Chicago area, outside city | 1,000 |
| Iowa | Ames | 200 |
| Maryland | Baltimore | 1,000 |
| | Montgomery County | 1,200 |
| Massachusetts | Braintree | 240 |
| | East Bridgewater (near Brockton) | 1,200 |
| | Lawrence | 1,000 |
| | Saugus (near Boston) | 1,200 |
| Missouri | St. Louis | 8,000 |
| New Jersey | Essex County (Newark area) | 1,000 |
| | Hackensack Meadowlands | 2,000 |
| | Union County (Elizabeth) or Middlesex County (New Brunswick) | 1,000 |

## APPENDIX B (cont.)

| State | City | Tons of Solid Waste Per Day (1980) |
|---|---|---|
| New York | Albany | 500 |
| | Hempstead, L. I. | 1,000 |
| | Monroe County (Rochester) | 500 |
| | New York City | 2,000 |
| | Westchester County (White Plains) | 1,500 |
| Ohio | Akron | 1,000 |
| | Cleveland | 500 |
| Oregon | Eugene | 700 |
| Pennsylvania | Philadelphia | 2,400 |
| Puerto Rico | San Juan | 1,000 |
| Tennessee | Knoxville | 500 |
| | Memphis | 500 |
| | Nashville | 750 |
| | Total Tons Per Day in 1980 | 36,290 |
| | Number of equivalent 1000 tons per day plants | 36 |

Source: Energy Conservation Through Improved Solid Waste Management, U. S. Environmental Protection Agency, 1974, pp. 15 and 16.

## APPENDIX C

## VERMONT MINIMUM DEPOSIT AMENDMENT

H. 228

An act to amend 10 V.S.A. subsections 1521, 1522, 1523, 1524, 1525 and to add 10 V.S.A. subsections 1522a, 1526 and 1527 relating to beverage containers.

Sec. 1. 10 V.S.A. subsection 1521 is amended to read:

Subsection 1521. DEFINITIONS

For the purpose of this Chapter:

(1) "Beverage" means beer or other malt beverages and mineral waters, soda water and carbonated soft drinks in liquid form and intended for human consumption.

(2) "Biodegradable material" means material which is capable of being broken down by bacteria into basic elements.

(3) "Container" means the individual, separate, bottle, can, jar or carton composed of glass, metal, paper, plastic or any combination of those materials containing a consumer product. This definition shall not include containers made of biodegradable material.

(4) "Distributor" means every person who engages in the sale of consumer products in containers to a dealer in this state including any manufacturer who engages in such sales.

(5) "Manufacturer" means every person bottling, canning, packing or otherwise filling containers for sale to distributors or dealers.

(6) "Recycling" means the process of sorting, cleansing, treating and reconstituting waste and other discarded materials for the

purpose of reusing the materials in the same or altered form.

(7) "Redemption center" means a store or other location where any person may, during normal business hours, redeem the amount of the deposit for any empty beverage container labeled or certified pursuant to Section 1524 of this Title.

(8) "Refillable" means a beverage container which can be refilled at least five times and is so certified by type by the secretary.

(9) "Secretary" means the secretary of the agency of environmental conservation.

Sec. 2. 10 V.S.A. subsection 1522 is amended to read:

Subsection 1522. BEVERAGE CONTAINERS; DEPOSIT

(a) A deposit of not less than five cents shall be paid by the consumer on each beverage container sold at the retail level and refunded to him upon return of the empty beverage container.

(b) A retailer or a person operating a redemption center who redeems beverage containers shall be reimbursed by the manufacturer or distributor of such beverage containers in an amount which is at least twenty percent of the amount of the deposit returned to the consumer.

(c) The secretary may promulgate rules and regulations necessary to implement this chapter.

(d) The secretary shall prepare and print suitable posters for sale, at cost, to persons who wish to post the hours during which containers will be redeemed at their places of business. Containers shall be redeemed during no fewer than 40 hours per week during the regular

operating hours of the establishment. The poster shall be substantially in the following form:

NOTICE TO CUSTOMERS

In accordance with the provisions of Section 1523(a) of Title 10, Vermont Statutes Annotated, this store will redeem clean beverage containers during the following 40 or more hours of each week:

Monday ...................................
Tuesday ...................................
Wednesday ...................................
Thursday ...................................
Friday ...................................
Saturday ...................................
Sunday ...................................

...................................
(Name of store or establishment)

...................................
(Operator, manager, or owner)

Sec. 3. 10 V.S.A. subsection 1522a is added to read:

Subsection 1522a. LITTER LEVY

(a) A levy is hereby exacted on all vinous and spirituous beverage containers sold in the state intended for resale, use or consumption in this state at the rate of 4 mills on each container sold. As used in this section "beverage" includes vinous and spirituous beverages as defined in Section 2 of Title 7.

## APPENDIX C (cont.)

(b) The levy provided in this section shall be paid by every manufacturer or distributor to the commissioner of taxes. Whenever a retailer, group of retailers or retail chain contracts for, receives consignment of, or in any other manner acquires vinous or spirituous beverages in beverage containers outside of the state for sale, use or consumption in the state, the levy exacted pursuant to this section shall be paid to the commissioner of taxes by such retailer, retail group or chain. The commissioner of taxes shall adopt and publish all forms and regulations necessary for the purpose of this chapter.

Sec. 4. 10 V.S.A. subsection 1523 is amended to read:

Subsection 1523. ACCEPTANCE OF BEVERAGE CONTAINERS

(a) Except as provided in Section 1522 of this Title:

(1) A retailer shall not refuse to accept from any person any empty beverage containers of the kind, size and brand sold by the retailer, or refuse to pay to that person the refund value of a beverage container as established by section 1522 of this title, except as provided in subsection (b) of this section.

(2) A manufacturer or distributor may not refuse to accept from a retailer or a person operating a redemption center any empty beverage containers of the kind, size and brand sold by the manufacturer or distributor, or refuse to pay the retailer or a person operating a redemption center the refund value of a beverage container as established by section 1522 of this title.

## APPENDIX C (cont.)

(b) A retailer, with the prior approval of the secretary, may refuse to redeem beverage containers if a redemption center or centers are established which serve the public need.

(c) A retailer or a person operating a redemption center may refuse to redeem beverage containers which are not clean.

(d) A retailer or group of retailers may petition the secretary for the establishment of a redemption center.

(e) The secretary shall, upon due notice to the public and other affected parties, hold a public hearing upon the petition. After investigation and hearing, the secretary, after determination of need and service to be provided by the establishment of a redemption center, shall issue his order authorizing the distributors or retailers affected and servicing the community or area involved to establish a redemption center or alternate method of redemption, or shall deny the petition if found adverse to the public need.

Sec. 5. 10 V.S.A. subsection 1524 is amended to read:

Subsection 1524. LABELLING

(a) Every beverage container sold or offered for sale at retail in this state shall clearly indicate by embossing or imprinting on the normal product lable, or in the case of a metal beverage container on the top of the container, the word "Vermont" and the refund value of the container in not less than one-quarter inch type size.

(b) This Section shall not apply to beverage containers which are certified as refillable by the secretary.

## APPENDIX C (cont.)

Sec. 6. 10 V.S.A. subsection 1525 is amended to read:

Subsection 1525. PROHIBITIONS

No beverage shall be sold or offered for sale at retail in this state:

(1) in a metal container designed and constructed so that part of the container is detachable in opening the container, or in a glass beverage container which has not been certified as refillable by the secretary.

(2) in containers connected to each other with plastic rings or similar devices which are not classified as biodegradable by the secretary.

Sec. 7. 10 V.S.A. subsection 1526 is added to read:

Subsection 1526. EDUCATIONAL PROGRAM

(a) State informational material such as travel pamphlets, road maps and similar publications submitted for printing on or after July 1, 1975 shall bear information relating to this chapter. This information shall take the form of a standard public statement relating to the deposit law provided by the secretary.

(b) The department of education may incorporate information on this chapter in educational material which it normally distributes to primary and secondary educational institutions within the state. The department may cooperate with the agency of environmental conservation in distributing any additional informative material on this chapter to schools in the state.

## APPENDIX C (cont.)

Sec. 8. 10 V.S.A. subsection 1527 is added to read:

Subsection 1527. PENALTY

A person who violates a provision of this chapter shall be fined not more than $1,000.00 for each violation.

Sec. 9. This act shall take effect July 1, 1975, except that Section 5 of this act shall take effect September 1, 1975 and section 6 of this act shall take effect January 1, 1977.

# APPENDIX D

## OREGON MINIMUM DEPOSIT LAW AS AMENDED

Relating to beverage containers; and providing penalties.

BE IT ENACTED BY THE PEOPLE OF THE STATE OF OREGON:

Section 1. As used in this Act, unless the context requires otherwise:

(1) "Beverage" means beer or other malt beverages and mineral waters, soda water and similar carbonated soft drinks in liquid form and intended for human consumption.

(2) "Beverage container" means the individual, separate sealed glass, metal or plastic bottle, can, jar or carton containing a beverage.

(3) "Commission" means the Oregon Liquor Control Commission.

(4) "Consumer" means every person who purchases a beverage in a beverage container for use or consumption.

(5) "Dealer" means every person in this state who engages in the sale of beverages in beverage containers to a consumer, or means a redemption center certified under section 8 of this Act.

(6) "Distributor" means every person who engages in the sale of beverages in beverage containers to a deal in this state including any manufacturer who engages in such sales.

(7) "In this state" means within the exterior limits of the State of Oregon and includes all territory within these limits owned by or ceded to the United States of America.

## APPENDIX D (cont.)

(8) "Manufacturer" means every person bottling, canning or otherwise filling beverage containers for sale to distributors or dealers.

(9) "Place of business of a dealer" means the location at which a dealer sells or offers for sale beverages in beverage containers to consumers.

(10) "Use or consumption" includes the exercise of any right or power over a beverage incident to the ownership thereof, other than the sale or the keeping or retention of a beverage for the purposes of sale.

SECTION 2. (1) Except as provided in subsection (2) of this section, every beverage container sold or offered for sale in this state shall have a refund value of not less than five cents.

(2) Every beverage container certified as provided in section 6 of this Act, sold or offered for sale in this state, shall have a refund value of not less than two cents.

SECTION 3. Except as provided in Section 4 of this Act:

(1) A dealer shall not refuse to accept from any person any empty beverage containers of the kind, size and brand sold by the dealer, or refuse to pay to that person the refund value of a beverage container as established by section 2 of this Act.

(2) A distributor shall not refuse to accept from a dealer any empty beverage containers of the kind, size and brand sold by the distributor, or refuse to pay the dealer the refund value of a beverage

## APPENDIX D (cont.)

container as established by section 2 of this Act.

SECTION 4. (1) A dealer may refuse to accept from any person, and a distributor may refuse to accept from a dealer any empty beverage container which does not state theron a refund value as established by section 2 of this Act.

(2) A dealer may refuse to accept and to pay the refund value of empty beverage containers if the place of business of the dealer and the kind of brand of empty beverage containers are included in an order of the commission approving a redemption center under section 8 of this Act.

SECTION 5. (1) Every beverage container sold or offered for sale in this state by a dealer shall clearly indicate by embossing or by a stamp, or by a label or other method securely affixed to the beverage container, the refund value of the container.

(2) Subsection (1) of this section shall not apply to glass beverages containers designed for beverages having a brand name permanently marked thereon which, on the operative date of this Act had a refund value of not less than five cents.

(3) No person shall sell or offer for sale at retail in this state any metal beverage container so designed and constructed that a part of the container is detachable in opening the container without the aid of a can opener.

SECTION 6. (1) To promote the use in this state of reusable beverage containers of uniform design, and to facilitate the return of

containers to manufacturers for reuse as a beverage container, the commission may certify beverage containers which satisfy the requirements of this section.

(2) A beverage container may be certified if:

(a) It is reusable as a beverage container by more than one manufacturer in the ordinary course of business; and

(b) More than one manufacturer will in the ordinary course of business accept the beverage container for reuse as a beverage container and pay the refund value of the container.

(3) The commission may by rule establish appropriate liquid capacities and shapes for beverage containers to be certified or decertified in accordance with the purposes set forth in subsection (1) of this section.

(4) A beverage container shall not be certified under this section if by reason of its shape or design, or by reason of words or symbols permanently inscribed thereon, whether by engraving, embossing, painting or other permanent method, it is reusable as a beverage container in the ordinary course of business only by a manufacturer of a beverage sold under a specific brand name.

SECTION 7. (1) Unless an application for certification under section 6 of this Act is denied by the commission within 60 days after the filing of the application, the beverage container shall be deemed certified.

APPENDIX D (cont.)

(2) The commission may review at any time certification of a beverage container. If after such review, with written notice and hearing afforded to the person who filed the application for certification under section 6 of this Act, the commission determines the container is no longer qualified for certification, it shall withdraw certification.

(3) Withdrawal of certification shall be effective not less than 30 days after written notice to the person who filed the application for certification under section 6 of this Act, and to the manufacturers referred to in subsection (2) of section 6 of this Act.

SECTION 8. (1) To facilitate the return of empty beverage containers and to serve dealers of beverages, any person may establish a redemption center, subject to the approval of the Oregon Liquor Control Commission, at which any person may return empty beverage containers and receive payment of the refund value of such beverage containers.

(2) Application for approval of a redemption center shall be filed with the commission. The application shall state the name and address of the person responsible for the establishment and operation of the redemption center, the kind and brand names of the beverage containers which will be accepted at the redemption center and the names and addresses of the dealers to be served by the redemption center. The application shall include such additional information as the commission may require.

(3) The commission shall approve a redemption center if it finds the redemption center will provide a convenient service to

persons for the return of empty beverage containers. The order of the commission approving a redemption center shall state the dealers to be served by the redemption center and the kind and brand names of empty beverage containers which the redemption center must accept. The order may contain such other provisions to insure the redemption center will provide convenient service to the public as the commission may determine.

(4) The commission may review at any time approval of a redemption center. After written notice to the person responsible for the establishment and operation of the redemption center, and to the dealers served by the redemption center, the commission may, after hearing, withdraw approval of a redemption center if the commission finds there has not been compliance with its order approving the redemption center, or if the redemption center no longer provides a convenient service to the public.

SECTION 9. The procedures for certification or withdrawal provided for in sections 6 to 8 of this Act shall be in accordance with ORS chapter 183.

SECTION 10. (1) Any person who violates section 2, 3 or 5 of this Act shall be punished, upon conviction, as for a misdemeanor.

(2) In addition to the penalty prescribed by subsection (1) of this section, the commission or the State Department of Agriculture may revoke or suspend the license of any person who wilfully violates section 2, 3 or 5 of this Act, who is required by ORS chapter 471 or 635,

respectively, to have a license.

SECTION 11. (1) During the period commencing October 1, 1972, and ending when it submits the report provided for in subsection (2) of this section, the Legislative Fiscal Committee shall cause to be conducted a study of the operation of sections 1 to 10 of this Act that shall include, but not be limited to, an analysis of:

(a) Its economic impact on persons licensed under ORS chapter 635 who engage in the nonalcoholic beverage manufacturing business, on persons engaged in the business of manufacturing beer and other malt beverages and on persons engaged in the business of manufacturing beverage containers in complying with the provisions of sections 1 to 10 of this Act.

(b) The problems, if any, incurred in the distribution, sale and return of beverage containers subject to the provisions of section 1 to 10 of this Act.

(c) The effectiveness of the provisions of sections 1 to 10 of this Act in the reduction of the incidence of the littering of beverage containers in this state.

(d) The costs incurred in the enforcement of the provisions of sections 1 to 10 of this Act.

(2) Prior to January 1, 1975, the Legislative Fiscal Committee shall prepare and submit to the Fifty-eight Legislative Assembly of the State of Oregon a report of its findings made pursuant to subsection (1) of this section and its recommendations with respect to any legislative

## APPENDIX D (cont.)

proposals considered by it to be necessary as the result of the study conducted as required by subsection (1) of this section.

SECTION 12. This Act shall not become operative until October 1, 1972, and shall apply to all beverage containers sold or offered for sale after October 1, 1972, except that applications under sections 6 and 8 of this Act may be made prior to October 1, 1972, the certification referred to in section 6 of this Act and the approval referred to under section 8 of this Act may be delivered prior to October 1, 1972, and the commission shall adopt rules and regulations under sections 6 and 8 of this Act prior to October 1, 1972.

# APPENDIX E

## BEVERAGE CONTAINER MINIMUM DEPOSIT LEGISLATIVE CONSIDERATIONS

A mandatory deposit system is the most effective means of assuring a switch to a predominantly refillable beverage container system. If it is determined that the energy, resource and economic impacts of a shift to a predominantly refillable beverage container system warrant legislative action requiring a minimum deposit on all soft drink and beer containers, that legislation should address the following considerations:

1) Returnable containers.--Any mandatory deposit beverage container legislation should specify that all containers packaging "beverages" (defined as all carbonated and malt beverages) be subject to a minimum deposit. In essence, all containers are deemed "returnable", since they may be refilled, recycled, or disposed of.

2) Deposit level.--Deposits should be high enough to provide an incentive for return, but low enough to make them an economically attractive alternate to manufacturers to "buy back" (i.e., for the deposit) rather than buy new containers. Current container prices suggest a 5 cent deposit would suit these purposes. Deposit levels might have to be periodically reviewed, however.

3) Certified standard containers.--Containers certified as usable by more than one brand of beverage manufacturer facilitate consumer convenience in returning containers and

APPENDIX E (cont.)

have had the highest return rates in Oregon. A deposit level of 3 cents for such containers would be appropriate.

4) Return of containers.--Legislation should specify that the redeemer of the deposit may be any individual returning an empty container of the shape, size and color sold by the retailer. Thus, identical bottles used by differing brands (not "certified") may be redeemed. The provision that the container be empty should help minimize health-related nuisances for the retailer. Similarly, the supplier of the retailer should be required to accept for redemption from the retailer all empty containers of the shape, size and color the supplier distributes.

5) Phase-In.--To take advantage of consumer and industry trends, and to facilitate economic readjustments to a mandatory deposit system, a phase-in period allowing approximately three years before implementation of the deposit system should be allowed.

While a ban on nonrefillable bottles and cans generally has severe problems in terms of equity and effectiveness, some selective bans on aspects of beverage containerization would not necessarily contradict the intent of mandatory deposit legislation. The "pop-top" closure on cans is a case in point. Oregon's ban on "pop-top" cans has probably reduced a health and safety problem without affecting consumer convenience (a new "push-in" top has been developed for the Oregon market).

## APPENDIX E (cont.)

Source: No Deposit No Return, A Report on Beverage Containers, prepared by the Task Force on Critical Problems of the New York State Senate, February 1975.

# APPENDIX F

## TEXTS OF TWO EPA SOURCE REDUCTION FACT SHEETS

### SOURCE REDUCTION FACT SHEET: RED OWL STORES PROGRAM

### What is Source Reduction?

Source reduction is a group of concepts each aimed toward lowering the consumption of materials and/or products resulting in a reduction in the generation of wastes. Industries, governments, commercial establishments, and consumers can take actions to reduce the quantity of wastes produced. Source reduction activities relate to:

Product Reuse--The development and use of products that can be reused

Reduced Resource Intensivity--The development and use of products that use less material and energy to manufacture

Increased Product Lifetimes--The development and use of products with longer useful lifetimes

Decreased Product Consumption--Directly reducing the consumption of products

### Why a Fact Sheet?

Our current energy and material shortages have shown that we must all consider ways of conserving resources and reducing our generation of waste. As Russell Train, Administrator of EPA, has said "...we must seek to reduce the amount of unnecessary waste that we generate. We must begin to consider the total environmental consequences of our traditional mining, manufacturing, marketing, and distribution practices

## APPENDIX F (cont.)

and alter them as necessary in our time, rather than waiting until yet another crisis has engulfed us." Numerous businesses and consumers are developing ways of accomplishing these goals. These individual actions can often be duplicated by others. But the required knowledge is not generally available. The Source Reduction Program of the Office of Solid Waste Management, U. S. Environmental Protection Agency, is attempting to inform others of the potential savings available from source reduction actions through this fact sheet.

### Who did What?

Red Owl Stores, Inc., (a supermarket chain in Minnesota, North Dakota, South Dakota, Wisconsin, Iowa, and Michigan), has established a program designed to stimulate the reuse of paper shopping bags, egg cartons, and milk containers. The chain also sells a plastic shopping bag that can be reused at least 25 times.

### When and Where?

This program was initiated in the Milwaukee, Wisconsin, area (ten stores in the city, two in the suburbs). The results reported here are for an 8-week market test from June 25 to August 18, 1973.

### Program Design

In order to inform the consumer of the environmental and economic savings involved with reuse of packaging materials, Red Owl Stores advertised the benefits of their program in local newspapers. The

program itself consisted of three major parts.

(1) Cash refunds--The consumer received 2 cents for each paper shopping bag refilled. A 3-cent refund was allowed for each egg carton repacked from a bulk display.

(2) Promotion of refillable milk containers--Advertising stressed the consumer savings if refillable containers were used. a 4-cent refund was allowed for each such container returned (both glass and plastic).

(3) Provision of plastic shopping bags--A plastic reusable shopping bag was sold (25¢). The consumer was asked to use and reuse this bag instead of single-use paper bags. A 2-cent refund for refilling was allowed each time the plastic bag was used.

## Results

During the 8-week test program an average of 1,260 egg cargons were repacked per week, 1,280 bags were refilled per week, and 1,900 gallons of milk in returnable containers were sold per week. Over 14,000 plastic bags were sold, although data on their use was not available.

Most consumers (both users and nonusers) and store employees felt the program was an excellent idea and approved of the environmental goals. The store management felt the program was successful. It has been continued and expanded into the Minneapolis area. Future expansion into other stores is being examined.

## APPENDIX F (cont.)

Materials Saved--Red Owl stores estimated the amount of materials used in each of the products involved (0.13 lbs. per paper bag, 0.11 lbs. per molded-paper egg carton, 0.28 lbs. per half gallon paper milk container). Therefore, they estimated that the 8-week program saved a total of 10,940 lbs. or 5.5 tons of paper packaging (1,331 lbs. paper bags, 1,109 lbs. paper egg cartons, and approximately 8,500 lbs. paper milk containers).

Annual savings were projected to be 6 times this amount or 33 tons of paper packaging. If a program of this type was instituted nationally substantial additional savings, both for materials and energy used to make these materials, would occur.

Cost--Consumer refunds were equivalent to the cost of the paper shopping bags and egg cartons to the store. Therefore, there were no direct costs of the program to the store, while consumers saved money for their response. Additional time at the check out counter and handling of returned containers were reported to be insignificant--no noticeable decline in employee productivity. The advertising expenditures used to promote the program came from the normal advertising budget. It appears that the extent of free advertising generated (on radio, television, newspapers and magazines) more than compensated for the paid advertising used.

Insights Gained--The program was felt to be very dependent on advertising, although a core group of consumers will stay with the program

for personal reasons. Plastic refillable milk containers were received more favorably than expected. There were 1,900 gallons of milk (sold in either glass or plastic containers) returned to all stores, 600 of these gallons were plastic containers although only one of the twelve stores in the program sold milk in plastic refillable containers. The use of plastic has been expanded so that most of the Milwaukee stores now carry these containers and consideration is being given to expanding the use of plastic refillable containers to other stores. For further information concerning the Red Owl Stores program please contact Mr. Alan K. Green, Environmental Concerns Chairman, Red Owl Stores, Inc., 215 East Excelsior Ave., Hopkins, Minn. 55343.

## SOURCE REDUCTION FACT SHEET:

## PROGRAM OF INTERNATIONAL PAPER COMPANY AND WELLS DAIRY

### Who did What?

International Paper Company has redesigned the half-pint milk container in an innovative attempt to conserve resources. The new package, called Eco-Pak, yields a significant reduction in the two materials, paper and plastic, used in milk containers. Wells Dairy, a major Iowa dairy, is using it.

### When and Where?

This new package design was first used in February 1974 by Wells Dairy of Lemars, Iowa, which serves a market area including portions of

APPENDIX F (cont.)

Iowa, Nebraska, South Dakota, and Minnesota. The majority of its half-pint sales are for use in local schools. The results reported here are for the 5-month test period from February to June 1974, during which the dairy used 75,000 units per day.

### Program Design

International Paper Company concluded, in reviewing their half-pint milk container design, that material use could be reduced by product design changes. The result was a new design that still contained a half-pint of milk but required less material. Not only was the shape of the container changed (the base is now 2 1/4 inches compared to 2 3/4 for the standard half-pint), but a lighter-weight yet stronger paperboard fiber was used. Together, these changes resulted in a 31 percent reduction in paper use and a 16 percent reduction in low-density polyethylene plastic coating requirements for each half-pint milk container.

### Results

During the test market period of approximately 100 school days, Wells Dairy produced and distributed about 7.5 million half-pints of milk. Initial reaction by both Wells Dairy and the local school systems has been good because the new package is both convenient and economical.

Materials Saved--The Standard half-pint milk container uses 488 pounds of paper and 62 pounds of low-density polyethylene plastic for every 1,000 gallons of milk contained. The Eco-Pak half-pint container

APPENDIX F (cont.)

uses only 336 pounds of paper and 52 pounds of plastic for each 1,000 gallons of milk. The direct material savings for the test period conducted by Wells Dairy amounted to almost 36 tons of paper and about 2.5 tons of plastic.

If all half-pint milk containers in the nation were converted to the redesigned package, annual material savings would amount to 59,000 tons of paper and 4,000 tons of plastic. An obvious decrease in waste generation and savings in solid waste management costs would also result.

In addition, energy and pollution reductions would result because less raw material would be processed into final products. The amount of pollution reduction would depend on the level of operating pollution controls. Calculations using anticipated 1976 control standards for air and waterborne pollutants result in estimated reductions in air emissions of 1,600 tons and waterborne wastes reductions of over 600 tons from the paper savings alone. Estimated energy savings resulting from reduced paper production would amount to over 2.3 trillion Btu annually, the equivalent of 1,100 barrels of oil per day.

Cost Savings--Direct cost savings to the dairy industry come from three sources: lower initial material costs, equipment design changes that result in increased filling speed, and transportation savings. These cost savings can be passed on to the consumer in lower prices. International Paper Company estimates that over $10 million could be saved annually by the dairy industry in material costs if it converted to

## APPENDIX F (cont.)

the new design. Wells Dairy has been using new filling and sealing equipment that can operate at speeds of up to 240 cartons per minute; in comparison its former equipment ran at the rate of 75 per minute. Transportation cost savings can be achieved since 50 of the new half-pint cartons can be packaged in a standard carrier as compared with 44 cartons of the standard half-pint.

The cost savings already identified may be increased as newer designs for equipment become available and optimal transportation methods are achieved. As of April 1975 Wells Dairy is still using the container and is satisfied with the operation of the new equipment designed for the container. An additional benefit of the slimmer container is that it can be held more easily by small children.

For further information please contact Mr. Joseph Cannon, Product Manager, International Paper Company, 220 East 42nd Street, New York, New York; and Mr. Fay Wells, Wells Dairy, 121 Second Avenue, Lemars, Iowa.

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